

ANNUAL REPORT
OF THE
NEBRASKA
STATE BOARD OF HORTICULTURE.
—
1890.
—

By G. J. CARPENTER.

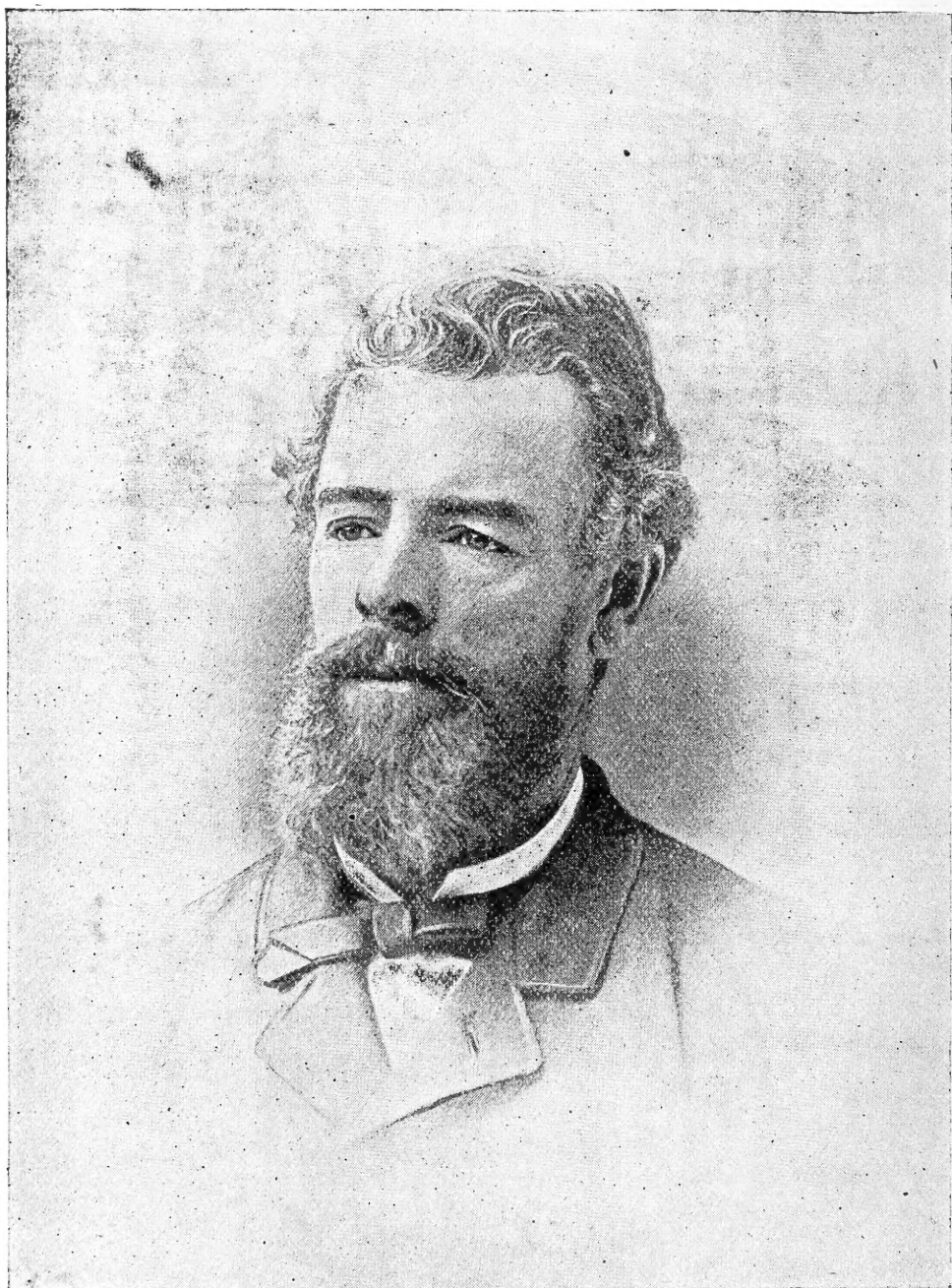
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Wm. L. G. B. B.



HON. SAMUEL BARNARD.

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Nebraska State Horticultural Society.

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ANNUAL REPORT

OF THE

NEBRASKA

STATE HORTICULTURAL SOCIETY,

FOR THE YEAR 1890.

CONTAINING THE PROCEEDINGS OF THE ANNUAL AND SEMI-
ANNUAL MEETINGS HELD DURING THE YEAR 1890.

EDITED BY THE SECRETARY. PUBLISHED BY THE STATE.



LINCOLN, NEB.:
STATE JOURNAL COMPANY, PRINTERS.
1890.



LETTER OF TRANSMITTAL.

OFFICE OF THE SECRETARY,
NEBRASKA STATE HORTICULTURAL SOCIETY,
FAIRBURY, October 15, 1890.

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To His Excellency, JOHN M. THAYER, Governor of the State of Nebraska:

Complying with the statutes of the state of Nebraska relating to the Nebraska State Horticultural Society, we are pleased to submit for your inspection and consideration a copy of the Annual Report for the year 1890, hoping it will receive as much of your attention and criticism as it may merit.

The past year has been productive of much good in our particular line of work; our meetings have had a larger attendance than ever before, and each member seemed to vie with the others in bringing out in papers and discussions all the points pertaining to the welfare and advancement of horticulture in general and that of this state in particular. We do not deem it necessary to dwell upon the fact that horticulturists are doing a grand work in improving the state of Nebraska, for this is apparent to all observant minds, and your excellency cannot have failed to appreciate it.

In the following pages will be found, amongst other things, some discussions relative to the establishment by our society of Horticultural Experiment Stations, which, though excellent in design, we were compelled to abandon for a while at least, owing to a peculiar wording in the bill appropriating the money which now is drawn by our society.

Trusting that the Report for 1890 may meet with your approval, we have the honor to be,

Your obedient servants,

G. J. CARPENTER, *Secretary.*

F. W. TAYLOR, *President.*



OFFICERS AND STANDING COMMITTEES, 1890.

OFFICERS.

F. W. Taylor, President.....	Omaha.
W. R. Harris, First Vice President.....	Tecumseh.
H. H. Blodgett, Second Vice President.....	Lincoln.
G. J. Carpenter, Secretary	Fairbury.
Peter Youngers, Treasurer	Geneva.

DIRECTORS.

W. J. Hesser	Plattsmouth.
E. F. Stephens.....	Crete.
R. N. Day.....	Tekamah.

STANDING COMMITTEES.

NECROLOGY.

G. J. Carpenter.....	Fairbury.
O. F. Smith.....	Ansley.
G. R. Marshall.....	Arlington.

EXHIBITS.

D. U. Reed.....	Blue Springs.
G. W. Alexander.....	Friend.
C. G. Laing.....	Springfield.

FINAL RESOLUTIONS.

R. N. Day.....	Tekamah.
Peter Youngers, Jr.....	Geneva.
Prof. C. E. Bessey.....	Lincoln.

FRUIT DISTRICTS.

No. 1.—SOUTHEASTERN DISTRICT.

(Embraces the following counties. J. M. Russell, Wymore, Nebr.,
Director.)

Polk, Seward, Saline, Richardson, Butler, York, Gage, Pawnee,
Saunders, Hamilton, Johnson, Jefferson, Cass, Clay, Otoe, Thayer,
Lancaster, Fillmore, Nemaha, Nuckolls.

No. 2.—NORTHEASTERN DISTRICT.

(Embraces the following counties. R. N. Day, Tekamah, Nebr.,
Director.)

Sarpy, Douglas, Washington, Dodge, Colfax, Platte, Burt, Cuming,
Stanton, Madison, Antelope, Holt, Pierce, Wayne, Dakota, Dixon,
Cedar, Knox.

No. 3.—CENTRAL DISTRICT.

(Embraces the following counties. John A. Hogg, Shelton, Nebr.,
Director.)

Hall, Buffalo, Boone, Nance, Sherman, Howard, Dawson, Wheeler,
Greeley, Loup, Merrick, Garfield, Blaine.

No. 4.—SOUTHWESTERN DISTRICT.

(Embraces the following counties. Geo. W. Hagan, Guide Rock,
Nebr., Director.)

Webster, Franklin, Harlan, Furnas, Red Willow, Hitchcock, Dundy,
Chase, Hayes, Frontier, Gosper, Phelps, Kearney, Adams, Lincoln.

No. 5.—NORTHWESTERN DISTRICT.

(Embraces the following counties. W. F. Jenkins, Arcadia, Nebr.,
Director.)

Sheridan, Valley, Keya Paha, Cherry, Custer, Brown, Box Butte,
Sioux, Dawes.

No. 6.—WESTERN DISTRICT.

(Embraces the following counties. E. Schroeder, Logan, Nebr.,
Director.)

McPherson, Cheyenne, Grant, Arthur, Thomas, Logan, Keith.

MEMBERS OF THE SOCIETY.

HONORARY MEMBERS.

*Barry, Patrick.....	Rochester, New York.
Budd, James L.....	Ames, Iowa.
Brackett, M. J.....	Denmark, Iowa.
Campbell, George.....	Delaware, Ohio.
Chase County Agricultural and Horticult- ural Society.....	Champion, Nebraska.
Earle, Parker.....	Cobden, Illinois.
Garfield, C. W.....	Grand Rapids, Michigan.
Gideon, Peter M.....	Excelsior, Minnesota.
Lyon, T. T.....	South Haven, Michigan.
Peffer, G. P.....	Pewaukee, Wisconsin.
Tracy, S. M.....	Columbia, Missouri.
Van Deman, K.....	Geneva, Kansas.
Williams, L. A.....	Glenwood, Iowa.

LIFE MEMBERS.

*Barnard, Samuel.....	Table Rock.
Bowen, W. R.....	513 N. 19th St., Omaha.
Brown, A. J.....	Geneva.
Beaver, E.....	Falls City.
Carpenter, G. J.....	Fairbury.
Craig, Hiram.....	Fort Calhoun.
Deweber, H. N.....	Pawnee City.
Davey, R. H.....	Omaha.
Dunlap, J. P.....	Dwight.
Erfling, E. C.....	1150 Sherman Ave., Omaha.
Furnas, R. W.....	Brownville.
Gage, J. A.....	Fairbury.

* Deceased.

Grennell, E. N.....	Fort Calhoun.
Harris, W. R.....	Tecumseh.
Hartley, E. T.....	Lincoln.
Hogg, J. A.....	Shelton.
Hesser, W. J.....	Plattsmouth.
Hartman, Chris.....	206 Shelley Block, Omaha.
Masters, J. H.....	Nebraska City.
Masters, J. W.....	Lincoln.
Sanborn, E. E.....	Springfield.
Stevens, E. F.....	Crete.
Smith, H. L.....	Geneva.
Taylor, F. W.....	Omaha.
Wilson, W. H.....	Lincoln.
Wheeler, D. H....	N. W. cor. 15th and Douglas sts., Omaha.
Youngers, Peter.....	Geneva.

ANNUAL MEMBERS.

Allen, Elijah.....	Care W. R. Bennett & Co., Omaha.
Allen, E. A.....	Western.
Alexander, G. W.....	Friend.
Bessey, Prof. Chas. E.....	Lincoln.
Bosley, A. T.....	Bower.
Blodgett, H. H.....	109 S. 10th st., Lincoln.
Burch, O. C.....	Fairbury.
Camp, C. B.....	Cheney.
Cole, W. P.....	Seward.
Crocker, J. C.....	Lincoln.
Dainton, S.....	Dorchester.
Davis, W. R.....	Champion.
Day, R. N.....	Tekamah.
DeFrance, C. Q.....	Fairbury.
Disbrow, Park.....	Arapahoe.
Dole, Edward W.....	Beatrice.
Fredenburg, B.....	Johnson.
Field and Farm.....	Denver, Colo.
Galbraith, G. B.....	Jansen.
Hadkinson, J. H.....	Weeping Water.

Harrison, C. S.....	Franklin.
Heater, J. N.....	Columbus.
Hedges, Clement.....	Bower.
Howard, J. L.....	Shenandoah, Ia.
Hyde, John.....	Washington, D. C.
Jenkins, W. F.....	Arcadia.
Laing, C. G.....	Springfield.
Lake, D. S., & Co.....	Blue Springs.
Longsdorf, H. A.....	Bellevue.
Maynard, F. D.....	Western.
Meyer, Otto.....	Lincoln.
Miller, D. E.....	Western.
Neff, J. G.....	Raymond.
Omaha Basket Mfg. Co.....	Omaha.
Perin, S. W.....	College Farm, Lincoln.
Preston, P.....	Exeter.
Porter, J. L.....	Pleasant Dale.
Reed, D. U.....	Blue Springs.
Rosenberger, A. F.....	Fairbury.
Russell, J. M.....	Wymore.
Slayton, G. A.....	Salem.
Strand, G. A.....	Minden.
Sellers, C. P.....	Western.
Smith, J. G.....	Experimental Farm, Lincoln.
Smith, O. F.....	Ansley.
Southwick, J. I.....	Bennett.
Sturtz, Geo. W.....	Plainview.
Warner, G. W.....	Syracuse.
Whitcomb, E.....	Friend.

CONSTITUTION, BY-LAWS, ETC.

1. This Society shall be called the NEBRASKA STATE HORTICULTURAL SOCIETY, and shall have for its object the promotion of Pomology, Forestry, Floriculture, and Gardening.

2. This Society shall hold at least two meetings each year, one at the time of the Annual Fair of the State Board of Agriculture, and the other at the call of the President.

3. The officers of the Society shall be a President, First and Second Vice Presidents, Secretary, and Treasurer.

4. The management of the Society shall devolve upon a Board of Directors, to be composed of the President, Vice Presidents, Secretary, Treasurer, and three Directors, to be elected at the annual meeting in January of each year. The directors shall also at such meeting appoint one advisory member from each judicial district, who shall act as chairman of any committee upon the subject of collecting statistics in his judicial district, or such other work as he may be called upon to perform in this Society or in his district.

5. The Society shall not contract debts, except by a vote of two-thirds of its members.

6. The acceptance of the office of President, Vice President, and Secretary, being filed with the Secretary, shall be considered as qualifying.

7. This Constitution may be amended or altered at annual meetings by a vote of two-thirds of the members present.

BY-LAWS.

1. The officers of this Society shall be elected at the January meeting.

2. The officers of this Society shall hold their respective offices until their successors are elected and qualified.

3. The first business of the meeting of the Society shall be on each morning, the reading of the minutes of the previous day's proceedings, and submitting the same to the approval of the meeting.

4. There shall be elected at each winter meeting six District Directors, one from each horticultural district in the state.

Also a standing committee of three on synonyms.

Also a standing committee of one in each of the following: Meteorology in its relation to Horticulture, Entomology, Ornithology, Geology, Forestry, Vegetable Culture, Ornamental Gardening.

5. These By-Laws may be amended at any general meeting of the Society by a majority of the members present.

REGULATIONS.

All entries for exhibition at the State Fair shall be made on or before six o'clock P. M. of the Monday preceding the opening of the Fair to the public.

All exhibits shall be in place by 12 M. on Tuesday of Fair week.

Fruits must be grown in the state, and by the exhibitor, and be correctly named and labeled.

Fruits and flowers competing for the same premiums must be arranged, as near as may be, together.

"Collections" of fruit must embrace at least five different varieties, and not less than five specimens of each variety, and arranged in a body or group.

The "Collection of Fruits," Lot 1, shall be separate and distinct from minor exhibits, but must be exhibited by the party growing, or in the name of the county in which grown, or in the name of the county horticultural or pomological society of the county in which grown.

"Seedlings" must be characterized for excellence equal at least with those of established varieties of same grade and season before being entitled to recognition by the Society.

Articles on exhibition or occupying space in hall cannot be removed during Fair except by special permit of the President. This rule is intended to prevent mere sale stands in hall, or of articles on exhibition.

All fruits obtaining premiums become the property of the Society, to be sent elsewhere for exhibition, as the Board of Directors may determine.

All fruits or other articles in competition for the same premium must be arranged together in groups. This cannot be varied from. When not otherwise specified, there must be five perfect specimens of fruit on each plate, no more and no less. No duplicates of any kind will be tolerated.

When there is but one exhibitor competing for premium, committees may, at their option, award no premium, second, or first, as merit may warrant.

If any person shall exhibit for competition any fruits, flowers, or other articles not of his or her own production, as required by the regulations, said exhibitor shall forfeit any premium awarded and be debarred from competition for the term of five years.

All exhibits must remain on exhibition until 4:30 o'clock P. M. on the last day of the Fair, or premiums are forfeited.

RULES FOR JUDGING FRUITS, WITH A SCALE OF POINTS.

GENERAL RULES.

1st. In all cases the judges are to be governed by the letter and spirit of the schedule under which exhibitors have made their entries. The general appearance of the fruit, care in its selection, and taste displayed in its arrangement or grouping, each entry being distinctly separated from the rest. These are all elements of the highest importance, and should receive appropriate consideration by the committee.

2d. In every group, whether the single plates, the threes, fives, tens, or larger collections of fruit, there should never be more than one plate of any variety in any one group. Lists of the names of varieties exhibited shall accompany each group, and must be attached to the entry card, and have a corresponding number and designation—with or without exhibitor's name—according to rule.

3d. The *same plates* of fruit *cannot* compete for different prizes, though the several entries for the best ten, five, or other numbers, and the best plate may embrace the same varieties, but not the same plates of specimens; in each case they must be duplicates, and in sweepstakes they will count for a single variety.

4th. When the schedule prescribes the number of each kind, usually three or five, to be placed on exhibition, not less than the exact number must be presented.

5th. In general collections of fruits by individuals, counties, or otherwise, when the several species of fruits are specified in the schedule, they must all be presented, or the collection may be passed by the committee.

6th. In all cases, but more especially in the Display, or Greatest and Best Collections, *number* of varieties is the *prima facie* test of superiority; other things being equal; but quality, relative value, their perfect condition, and tasteful appearance will be considered, and should rank thus, respectively: 1. Number. 2. Quality or value. 3. Condition, approaching perfection. 4. Taste in the display. To illustrate: On a scale of ten—

No. 1 may have 100 plates, the largest collection.....	10
Quality: Some inferior varieties.....	5
Condition of fruits: Rather poor.....	5
Taste in display.....	5
Total.....	25

No. 2 may have 90 plates, ranking.....	8
Quality: Superior in most, ranking.....	8
Condition of fruit: Perfect, ranking.....	10
Taste in the arrangement: Good, ranking.....	8
Total.....	35

No. 2 would in this case take the premium.

In the case of single plates of the several kinds named, or in a competition for the best plate or basket of any kind of fruit, we may consider Condition, Form, Size, Color, and Texture, with Flavor. On the same scale we may have two entries to decide, thus:

No. 1.

Condition: Perfect.....	10
Form: Abnormal.....	8
Size: Overgrown... ..	8
Color: Perfect.....	10
Texture and flavor: Superior.....	10
<hr/>	
Total.....	46

No. 2.

Condition: Stem lost.....	8
Form: Perfect.....	10
Size: Uneven.....	6
Color: Too pale.....	6
Texture and flavor: Insipid.....	5
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Total.....	35

This scaling might be used in deciding between any number of single plates of designated varieties competing with one another for the best plate of any kind, or for the basket premium with assortment of single variety, according to the words of the schedule.

SPECIAL RULES.

The judges shall have an ideal standard of perfection in all cases, made up of the following particulars :

- 1st. The *condition* and general appearance of the fruit, which must be in its natural state, not rubbed or polished, nor specked, bruised, wormy, nor eroded ; with all its parts, stem, and calyx-segments well preserved, not wilted nor shriveled, clean.
- 2d. The *size*, in apples and pears particularly, should be average, and neither overgrown nor small. The specimens should be even in size.
- 3d. The *form* should be regular, or normal to the variety, and the lot even.
- 4th. The *color* and *markings*, or the *surface*, to be in character not blotched nor scabby.
- 5th. When comparing different varieties, and even the same kind grown on different soils, the *texture* and *flavor* are important elements in coming to a decision. Five points.

In the class PEACHES, PLUMS, etc., the important elements are *size, form, color, flavor, and condition*. Five points.

In GRAPES we must consider and compare the *form and size* of the bunches, the *size* of the berries, their *color, ripeness and flavor, and condition*. Five points.

In CURRANTS we shall have to examine the *perfection and size* of the bunches, and of the berries, their *flavor, and condition*. Three points.

In GOOSEBERRIES we shall look at the *size, color, flavor, and condition* of the fruit. Four points.

In judging CHERRIES we have as our guide the *size and form, color, flavor, and condition*. Four points.

In judging STRAWBERRIES we will compare the *size and form, color, flavor, firmness, and condition*. Five points.

They should be shown with stem and calyx.

RASPBERRIES may be shown with or without the calyx. In this fruit we shall have to judge of the *size, color, flavor, and condition*. Four points.

BLACKCAPS must have *size, color, flavor, and condition*. Four points.

BLACKBERRIES must be tested according as they present *size, color and form, flavor and texture, and condition*. Four points.

In all cases it is well to have a convenient scale of comparison, for which the number *ten* is found to be easily managed. The highest figure denotes perfection for the variety, and five is mediocre; below that is condemnatory. The total of the marks should exceed fifty per cent of the possible number, or the entry must be passed as unworthy of reward.

Seedlings having once been presented, and failing recognition under the rules of the Society, shall not again be presented.

ANNUAL MEETING.

FIRST DAY—MORNING SESSION.

LINCOLN, NEBR., January 14, 1890, 9 A. M.

The morning session was occupied in placing fruit on tables and admitting new members. The fruit exhibit was held in Grant Hall, Thirty-five (35) annual members were enrolled.

The afternoon session was called to order in Botanical Hall, President F. W. Taylor in the chair.

Reading minutes of previous meeting by Secretary Carpenter was first called up ; no objection being made the President approved them.

Next followed the President's annual address, the Secretary's and the Treasurer's reports.

Mr. Stephens moved we refer President's address and reports of Secretary and Treasurer to committees. Motion carried.

The President appointed Messrs. Reed, Hesser, and Alexander, as committee on reports of Treasurer and Secretary ; and Stephens, Russell, and Allen on President's address.

Mr. Carpenter, chairman of Legislative Committee, read the report of that body.

Mr. Dunlap moved to approve ; which was carried after some discussion as to whether the committee should have pay or not.

Upon motion of Marshall it was decided to retain the old committee on Legislation, viz., Carpenter, Day, and Stephens.

D. U. Reed moved to take up revision of Premium List, but after some discussion it was amended and passed to be taken up in morning session of January 15, 1890.

Carpenter moved to elect L. A. Williams, of Glenwood, Iowa, who represented the Iowa Horticultural Society at this meeting, and W. R. Davis, of Champion, Nebr., secretary Chase County Agricultural and Horticultural Society, as honorary members. Carried.

Adjourned to 7:30 o'clock P. M.

EVENING SESSION.

TUESDAY, January 14, 1890.

Called to order by President Taylor.

Paper on "Plums," by A. J. Brown. Discussion.

"Plums for the Platte Valley," by John A. Hogg, Shelton. Discussion.

Paper on "Peaches," by J. M. Russell, Wymore. Discussion.

The President read a letter from J. L. Brown, of Kearney, who touched on many points in fruit raising which were discussed by the members.

Paper on "Pears," by E. F. Stephens, followed by discussion.

Adjournment.

SECOND DAY—MORNING SESSION.

WEDNESDAY, January 15, 1890.

Called to order by President Taylor.

Election of officers came up first.

Stephens nominated Taylor for President, which was seconded and put to vote by acclamation, when Masters rose to a point of order, claiming we could not vote by acclamation according to our rules.

Stephens then moved to suspend the rules, which carried.

The following officers were then elected by acclamation: President, F. W. Taylor; First Vice President, W. R. Harris; Second Vice President, H. H. Blodgett; Secretary, G. J. Carpenter; Treasurer, Peter Youngers, Jr.; Executive Committee, E. F. Stephens, W. J. Hesser, and R. N. Day.

Mr. Stephens spoke concerning the State University and moved we appoint a committee of three, with our President as one, to advise with the officers of the State University.

Next followed reports of Committees on Revision of Premium List.

Moved to reinstate Rambo and Porter in Class 1; carried.

Moved to strike out Early Pennock; lost.

Moved to strike out G. G. Pippin from either Fall or Winter list; lost.

Motions to accept Lots 4, 5, 6, and 7, carried; amendment to motion on Lot 6 lost.

Barnard moved to amend Lot 8, making premiums for County and Individual Collection the same, changing county to (25 plates) \$20, \$10, and \$5. Amendment and motion carried.

The committee recommended changing Lot 1, Class 2, to Lot “—,” Class 1.

Stephens moved to act on recommendation.

Barnard and Carpenter objected to the motion, but favored making a new class for grapes; Stephens withdrew his former motion and moved to leave Lot 1, Class 2, and put pickles in Class 3. Carried. Stephens moved to accept report of committee on revision of premiums on grapes. Carried.

Motion to create Class 4—Nursery Stock, was carried.

Hon. J. Sterling Morton spoke at some length in response to a call from the President on “Root-Grafted Trees,” and was followed by ex-Governor Furnas, who spoke on the same subject.

The members showed a disposition to discuss the subject at length, but as the afternoon of the next day was reserved for apple trees the President closed debate.

Report on Class 3—Pickles. Motion to accept report; motion to amend by retaining peach butter, which the committee had stricken from the list; amendment prevailed and the amended report was accepted.

Motion to restrict jellies to one kind from each kind of fruit, or, in other words, where red currant jelly and white currant jelly are entered to call both currant jelly. Carried.

Moved to accept Lot 4. Carried.

President called for report of committee on Treasurer’s and Secretary’s reports.

Committee reported favorably.

Day moved to accept reports. Carried.

Adjournment.

AFTERNOON SESSION.

WEDNESDAY, January 15, 1890, 1:30 P. M.

President Taylor in the chair.

Motion by Stephens to carry over till evening the appointment of District Directors. Carried.

Resolution adopted that a committee of three be appointed to act in conjunction with the State Dairymen's Association.

Report of Committee on President's Address read by Stephens. Accepted.

Motion by day to adopt the recommendation concerning experiment stations. Carried after considerable discussion *pro* and *con*.

Motion to change the annual winter meeting from Lincoln to other points; out of order, as we are required by law to meet in Lincoln.

Motion to adopt the whole report of committee on President's address. Carried.

Papers were then read as follows: "Winter Apples," by Peter Youngers, Jr.; "Fall Apples," by R. N. Day; "Summer Apples," by Hiram Craig; "Keeping Apples," by J. H. Masters; "Marketing Apples," by Samuel Barnard; "Propagation of the Apple," by G. J. Carpenter. Discussion of all the papers on apples just read.

Motion to take up and discuss Barnard's samples of apple wood. Carried.

Long discussion on the apple question in all its phases.

Adjourned.

EVENING SESSION.

WEDNESDAY, January 15, 1890.

President Taylor in the chair.

Mr. John Craig being absent, a paper on "Grafting Stone Fruits" was read by Geo. W. Sturtz, of Plainview, a short discussion following.

Paper on "Potatoes," by J. G. Smith. Discussion.

"Grapes," a paper by G. W. Alexander, followed by discussion.

Paper on "Evergreens" laid over till next day.

H. E. Heath, of the *Nebraska Farmer*, read a humorous sketch on "How Can the Agricultural Press Aid the Horticulturist?"

Report of Committee on Rules and Regulations was then called up. Motion to adopt report. Carried.

Resolution introduced by B. A. Hawley, endorsing prohibition, was adopted by the Society.

Resolution introduced by Hugh McIntosh, of the *Stockman and Cultivator*, Omaha, condemning the present mode of free seed distribution by our general government and asking our representatives in congress to take steps for its repeal, was adopted.

Adjournment.

THIRD DAY—MORNING SESSION.

THURSDAY, January 16, 1890.

Called to order by President Taylor.

Call for report of District Directors.

No. 1—Southeastern District, Samuel Barnard, Director. No written report.

No. 2—Northeastern District, R. N. Day, Director. Read report.

Nos. 3 and 4—Central and Southwestern Districts, were not represented.

No. 5—Northwestern District, W. F. Jenkins, Director. Read report.

Election of District Directors resulted as follows :

No. 1, S. E.—J. M. Russell.....	Wymore.
No. 2, N. E.—R. N. Day.....	Tekamah.
No. 3, Central—John A. Hogg.....	Shelton.
No. 4, S. W.—Geo. W. Hagan.....	Guide Rock
No. 5, N. W.—W. F. Jenkins.....	Arcadia.
No. 6, W.—E. Schroeder.....	Logan.

W. R. Harris was not prepared with a paper, but spoke at some length on "Planting and Cultivation of Evergreens."

"Forest Trees for the Plains," a paper by Jas. A. Gage, was then read and discussed, after which the President read a clipping from a Baraboo, Wis., paper, the burden of which was condemnation of the timber culture laws.

Mr. Stephens had a paper prepared fully rebutting the arguments set forth in said clipping, and on request read the same to the Society.

Resolutions asking our representatives in congress to vote and work against the repeal of the timber culture laws were then read, and it was moved by Youngers to adopt.

Masters moved to amend by adding Stephens' paper. Amendment carried.

Day moved to amend by furnishing copy to all papers that would publish it ; this carried.

Hartley moved we instruct the Secretary to send copy to all agricultural papers. Carried.

Carpenter moved that we instruct Stephens to have four or five manifold copies of the resolution and paper type-written, at the Society's expense, said copies to be furnished the leading daily papers for publication. Carried.

Motion by Carpenter that we tender a vote of thanks to Messrs. Frey & Frey for the beautiful flowers furnished. Carried by a unanimous standing vote.

On nomination of Youngers, Messrs. Stephens and Taylor were elected to represent our Society at the meeting of the Iowa Horticultural Society, and they were instructed to present the timber culture resolution there.

"My Floral Treasures," a paper by Mrs. G. J. Carpenter, and "Home Adornments," by Miss Emily Jones, were then read.

Adjournment.

AFTERNOON SESSION.

THURSDAY, January 16, 1890.

Called to order by Treasurer Youngers, acting as Chairman *pro tem.* in the absence of the President and both Vice Presidents.

A paper by Mrs. R. N. Day, on "Canning and Pickling Fruits for Home Use," was being read by the Assistant Secretary, when a messenger announced the sudden death of Samuel Barnard. This threw the meeting into confusion—many leaving to ascertain the truth of the matter.

Chairman Youngers suggested a committee to draft resolutions of condolence to be sent to the relatives of the deceased.

Mr. Day made it a motion, which was carried.

The chairman then appointed Messrs. Masters, Day, Stephens, and Harris as a committee to draft the resolutions.

Upon motion of Day, \$5 was appropriated to drape the hall, when adjournment was moved and carried.

EVENING SESSION.

THURSDAY, January 16, 1890, 7 P. M.

President Taylor in the chair.

The Executive Committee reported having appointed four experiment stations and Directors for the same as follows: R. N. Day, Te-

kamah ; W. F. Jenkins, Arcadia ; W. R. Harris, Tecumseh ; U. L. Moore, Beaver City.

Youngers moved to appoint J. M. Russell, R. N. Day, and J. P. Dunlap a committee to attend upon the remains of Samuel Barnard, and the Society to bear the expense. Carried.

Moved by Carpenter that we hold the summer meeting at Crete, Nebr., subject to the call of the Executive Committee. Carried.

Moved by Youngers that we adopt the same fruit list as the one last year. Carried.

Mr. R. N. Day reported as chairman of Committee on Resolutions and read what had been drafted.

Carpenter moved the resolution be adopted, engrossed ; a copy sent to the family of deceased ; a copy placed on record, and inserted in our Annual Report ; a wood cut made of deceased's photo, and also inserted in the Report. Carried unanimously.

Mr. Dunlap urged the Society to take some action on a seedling apple he had on exhibition, and on motion of Carpenter it was named "Dunlap."

Adjourned *sine die*.

SUMMER MEETING.

MORNING SESSION.

CHAUTAUQUA GROUNDS, CRETE,
THURSDAY, July 31, 1890.

Called to order by President Taylor.

Minutes of the last meeting read by C. Q. DeFrance, Assistant Secretary. No objections being made the President announced their approval.

New members were admitted, and on motion of Carpenter committees on Necrology, Exhibits, and Final Resolutions were appointed.

The President named for committee on Necrology, Carpenter, O. F. Smith, and Marshall; Final Resolutions, Day, Youngers, and Bessey; Exhibits, Reed, Alexander, and Laing.

Adjourned to 2 P. M.

AFTERNOON SESSION.

THURSDAY, July 31, 1890.

President Taylor in the chair.

Paper on "Growing Small Fruits for Profit" was read by E. F. Stephens. This was followed by G. J. Carpenter's paper, "Is there a Better Strawberry for all Purposes than the Crescent?" Discussion.

Paper by Rev. Creighton, of Oberlin, Ohio, on "Pears and Pear Culture," was read and discussed.

"Best Method of Cultivating and Marketing Grapes," by G. W. Alexander, elicited some valuable hints in the discussion following.

Prof. Charles E. Bessey gave a half hour's talk on "Evolution in Horticulture," which caused considerable discussion.

President read a letter from John Hyde, and the meeting adjourned to 7:30 o'clock P. M.

EVENING SESSION.

THURSDAY, July 31, 1890.

Called to order by the President.

The President said it is time we begin to lay our plans to be well represented at the World's Fair.

Carpenter said he had received letters from Secretary Hammond, stating that a meeting would soon be called to meet in Chicago for the purpose of electing eight (8) Horticultural Directors, and that we should send delegates to that convention.

Harrison, of Franklin, moved that in all cases of this kind our President and Secretary be instructed to act for the Society. Carried.

Music by the Adelpian Quartette.

O. F. Smith then read his paper, "Should there be a Wind Break around Small Fruit Plantations?" Discussion.

Prof. C. E. Bessey spoke a few minutes on the question of our applying to the general government to have our experiment stations taken under the auspices of the State Experiment Stations now existing under provisions of the Hatch bill.

Motion to appoint Carpenter, Youngers, and Stephens as a special committee to confer with the Regents of the State University in regard to this matter. Carried.

Vote of thanks tendered the Adelpian Quartette.

Adjourned.

SECOND DAY.

FRIDAY, August 1, 1890.

At 8 o'clock this morning a number of conveyances were brought to the Society's headquarters and nearly all the members availed themselves of the opportunity to drive through the Crete nurseries. No business was done until after dinner.

AFTERNOON SESSION.

FRIDAY, August 1, 1890.

President Taylor, after calling the meeting to order, asked C. S. Harrison to read his article on "Evergreens," which was done. Discussion.

Discussion on Peter Younger's paper, "The Best Cherries."

U. L. Moore was on the programme for a paper on "Plums," but being absent the Society proceeded to discuss the plum question from its various standpoints.

Gooseberries and currants were next discussed.

A. J. Brown was called up to speak on the subject of Experiment Stations. After which the Society talked a short time about the damaged Horticultural building at Lincoln, and how to have it rebuilt.

Mr. Clyde Barnard brought up the subject of having some one to represent our Society at farmers' institutes, and on motion of Youngers, put by Carpenter, F. W. Taylor was elected State Lecturer to attend these institutes.

Motion to appoint a committee of three to attend meeting to be called at Lincoln, and to represent our Society there. Carried.

President appointed Stephens, Barnard, and D. U. Reed.

A paper on "How to Fight the Codling Moth," by E. F. Stephens, was read by C. Q. DeFrance and discussed by the Society.

Report of Committee on Exhibits read by Chairman Reed.

Motion to adopt this report carried.

Report of Committee on Necrology was made by Chairman Carpenter, who spoke at some length on the life of Patrick Barry. Adopted.

Report of Committee on Final Resolutions read by Chairman Day. Motion to amend by adding a vote of thanks to the railroads, for reduced rates ; to the Cosmopolitan Hotel, for many favors shown, and to the citizens in general, for their lively interest manifested in our behalf. Amendment carried and report as amended adopted.

A paper by E. F. Stephens on "Forestry" was read by DeFrance, and brought out many interesting points in the discussion following.

Motion by Brown to have two evening sessions at Lincoln during State Fair. Carried.

Decided to have committee work at the Cosmopolitan Hotel in the evening.

Adjourned *sine die*.

REPORTS OF OFFICERS AND COMMITTEES.

SECRETARY'S REPORT.

NEBRASKA STATE HORTICULTURAL SOCIETY,

In account with G. J. CARPENTER, SECRETARY.

1889.

CREDIT.

Twenty-seven annual memberships	\$27 00
Eight life memberships, at \$4.....	32 00
Four life memberships, at \$5.....	20 00
Warrant from state of Nebraska.....	2000 00
Warrant from State Agricultural Society.....	1000 00
September 9, warrant No. 36, for expenses	10 00
	<u>\$3089 00</u>

1889.

CONTRA, DR.

State Nebraska warrant to Treasurer	\$2000 00
State Agricultural Society warrant to Treasurer	1000 00
January 26, cash paid to Treasurer.....	11 00
January 17, drayage	50
January 17, stationery.....	75
January 23, postage stamps	2 00
January 23, telegrams	70
February 14, postage stamps	1 00
February 15, freight on Reports.....	4 50
February 15, drayage on Reports	1 00
May 7, express on stationery	2 50
May 21, postage.....	1 00
June 21, postage.....	2 00
June 28, postage.....	3 00
July 1, express on Reports	1 85
July 20, freight on Reports.....	5 90
July 21, drayage on Reports.....	1 50
July 27, postage stamps	1 50
September 5, telegrams.....	90
September 7, telegrams.....	30

September 8, freight on office fixtures	\$1 14
September 8, drayage	25
September 6, drayage	50
September 6, express	50
September 6, twine	20
September 6, hardware	75
September 6, broom.....	30
September 7, drayage	50
September 7, twine	10
September 7, pins	20
September 7, express.....	75
September 9, express.....	2 75
September 9, drayage	75
September 10, drayage	75
September 12, express	60
September 13, drayage	25
September 14, drayage	25
December 3, postage stamps.....	4 00
December 12, freight on reports.....	3 25
December 16, hard twine.....	1 00
December 16, one ream paper.....	3 50
December 16, drayage.....	50
July 7, legal cap paper.....	1 00
Total.....	<u>\$3065 69</u>
Total cash received.....	\$3089 00
Total cash paid out.....	<u>3065 69</u>
Balance on hand.....	<u>\$23 31</u>

(Signed) G. J. CARPENTER, *Secretary*.

LIST OF WARRANTS DRAWN.

1889.

January 17, S. Barnard, No. 1, officer's expenses.....	\$41 36
January 17, H. S. Gunder, No. 2, premium.....	30 00
January 17, Carpenter & Gage, No. 3, premium.....	20 00
January 17, J. A. Gage, No. 4, premium.....	5 00
January 17, E. Beavers, No. 5, premium.....	38 50
January 17, J. C. Cummings, No. 6, premium.....	10 00

January 17, J. L. Porter, No. 7, premium.....	\$6 50
January 17, H. Craig, No. 8, premium.....	51 50
January 17, J. P. Dunlap, No. 9, premium.....	1 50
January 17, J. H. Masters, No. 10, premium.....	29 50
January 17, W. J. Hesser, No. 11, premium.....	12 00
January 17, W. R. Harris, No. 12, premium.....	20 00
January 17, L. Stratton, No. 13, premium.....	50
January 17, R. N. Day, No. 14, premium.....	3 00
January 17, Peter Youngers, No. 15, premium.....	12 50
January 18, J. W. Masters, No. 16, labor.....	3 00
January 18, James Loughridge, No. 17, premium.....	1 00
January 18, L. H. Stoughton, No. 18, labor.....	8 00
January 18, R. N. Day, No. 19, labor.....	7 25
January 18, G. J. Carpenter, No. 20, secretary's salary.....	40 00
January 18, F. W. Taylor, No. 21, president's salary.....	9 00
February 2, S. C. Elliott, No. 22, plates.....	2 90
February 4, J. McIntosh, No. 23, printing.....	2 50
February 15, J. M. Hawkins, No. 24, printing.....	22 50
March 9, George Cross, No. 24½, printing.....	2 25
April 30, G. J. Carpenter, No. 25, secretary's salary.....	85 00
May 15, Smith & Seely, No. 26, printing.....	2 25
May 22, G. J. Carpenter, No. 27, salary.....	40 00
June 18, G. J. Carpenter, No. 28, salary.....	43 00
July 2, George Cross, No. 29, printing.....	7 00
July 20, G. J. Carpenter, No. 30, salary.....	42 00
July 27, S. Barnard, No. 31, postage.....	1 00
August 17, G. J. Carpenter, No. 32, salary.....	41 00
September 3, R. S. Graham, No. 33, postage.....	5 00
September 7, Herpolsheimer & Co., No. 34, muslin.....	20 00
September 9, S. A. Brown & Co., No. 35, lumber.....	8 50
September 9, G. J. Carpenter, No. 36, office expenses.....	10 00
September 10, F. W. Taylor, No. 37, president's salary.....	9 00
September 12, Carpenter & Gage, No. 38, premium.....	8 00
September 12, G. J. Carpenter, No. 39, premium.....	6 00
September 12, G. J. Carpenter, No. 40, salary.....	42 00
September 12, T. J. White, No. 41, labor.....	8 25
September 12, J. Barkley, No. 42, labor.....	9 00
September 12, J. M. Russell & Son, No. 43, labor.....	12 00

September 12, D. U. Reed, No. 44, labor.....	\$5 00
September 12, R. N. Day, No. 45, labor.....	3 00
September 12, D. S. Lake, No. 46, labor.....	1 00
September 12, F. W. Taylor, No. 47, salary.....	21 00
September 12, G. W. Alexander, No. 48, premium.....	26 00
September 12, J. M. Russell, No. 49, premium.....	30 00
September 12, C. M. Harrington, No. 50, premium.....	3 00
September 12, Captain Starr, No. 51, premium.....	2 00
September 12, Crete Nurseries, No. 52, premium.....	27 00
September 12, C. J. Bauman, No. 53, premium.....	33 00
September 12, J. Chase, No. 54, premium.....	5 00
September 12, R. N. Day, No. 55, premium.....	45 00
September 12, L. Johnson, No. 56, premium.....	1 00
September 12, W. E. Keys, No. 57, premium.....	1 00
September 12, William Downey, No. 58, premium.....	2 00
September 12, J. W. Fox, No. 59, premium.....	1 00
September 12, F. White, No. 60, premium.....	2 00
September 12, F. Rogers, No. 61, premium.....	2 00
September 12, Peter Youngers, No. 62, premium.....	98 00
September 12, P. F. Thomas, No. 63, premium.....	1 00
September 12, E. E. Sanborn, No. 64, premium.....	27 00
September 12, P. Ryan, No. 64½, premium.....	2 00
September 12, Johnson County Society, No. 65, premium..	30 00
September 12, J. U. Jury, No. 66, premium.....	2 00
September 12, J. C. Cummings, No 67, premium.....	4 00
September 12, J. Q. Robb, No. 68, premium.....	2 00
September 12, Thayer County Society, No. 69, premium...	10 00
September 12, H. Spirck, No. 70, premium.....	3 00
September 12, C. C. Beach, No. 71, premium.....	1 00
September 12, D. F. Kessler, No. 72, premium.....	2 00
September 12, Otoe County Society, No. 73, premium.....	20 00
September 12, B. E. Fenner, No. 74, premium.....	56 00
September 12, H. Craig, No. 75, premium.....	112 00
September 12, J. H. Hadkinson, No. 76, labor.....	4 00
September 12, L. C. Chapin, No. 77, labor.....	2 00
September 12, C. B. Keller, No. 78, labor.....	4 00
September 13, W. J. Hesser, No. 79, premium.....	37 00
September 13, Sawyer & Co., No. 80, premium.....	70 00

September 13, R. H. Davey, No. 81, premium.....	\$15 00
September 13, Foster & Son, No. 82, premium	125 00
September 13, Hess & Swoboda, No. 83, premium.....	82 00
September 13, L. C. Chapin, No. 84, premium.....	13 00
September 13, Warren & Arnold, No. 85, premium.....	72 00
September 13, Mrs. A. Parks, No. 86, premium.....	17 00
September 13, Maggie Davey, No. 87, premium.....	19 00
September 13, J. B. Congdon, No. 88, premium.....	3 00
September 13, Hess & Swoboda, No. 89, premium.....	4 00
September 13, J. W. Masters, No. 90, labor.....	1 45
September 13, Mrs. A. Parks, No. 91, premium.....	2 00
September 13, E. C. Erfling, No. 92, premium.....	101 00
September 13, M. W. Witter, No. 93, premium.....	3 00
September 13, Mrs. H. P. Foster, No. 94, labor.....	6 00
September 13, F. E. Newton, No. 95, labor.....	6 00
September 13, Miss Funk, No. 96, labor	2 00
September 13, Minnie Latta, No. 97, labor.....	24 00
September 13, Mrs. S. A. Latta, No. 98, labor	24 00
September 13, W. R. Harris, No. 99, labor.....	24 00
September 13, Mat Maul, No. 100, premium	1 00
September 13, Mrs. M. Scott, No. 101, premium	6 00
September 13, M. P. Husted, No. 102, premium	12 00
September 13, W. J. Bebout, No. 103, premium.....	32 50
September 13, M. H. McKay, No. 104, premium.....	23 50
September 13, Mrs. D. Husted, No. 105, premium	12 00
September 13, G. S. Baldwin, No. 106, premium	3 00
September 13, M. A. King, No. 107, premium	1 00
September 13, Mrs. P. Hedge, No. 108, premium.....	11 50
September 13, Mrs. V. H. Dyer, No. 109, premium.....	17 00
September 13, Annie Chapman, No. 110, premium.....	4 50
September 13, L. B. Wooster, No. 111, premium	12 50
September 13, M. A. Agey, No. 112, premium	1 50
September 13, Mrs. W. Hall, No. 113, premium	1 00
September 13, Mrs. S. J. Wilkins, No. 114, premium	6 00
September 13, Mrs. A. E. Baldwin, No. 115, premium	6 50
September 13, Mrs. J. W. Bell, No. 116, premium	50
September 13, M. D. Nichols, No. 117, premium	2 00
September 13, M. Wilkins, No. 118, premium	50

September 13, J. D. Slade, No. 119, premium.....	\$1 00
September 13, R. N. Day, No. 120, premium.....	12 50
September 13, M. J. Foxworthy, No. 121, premium	2 00
September 13, Mrs. J. Wagner, No. 122, premium.....	6 00
September 13, G. E. Bowerman, No. 123, premium	3 00
September 13, Mrs. A. B. Martin, No. 124, premium	1 00
September 13, Annie Blair, No. 125, premium	1 00
September 13, Mrs. M. D. Lyman, No. 126, premium.....	2 00
September 13, L. B. Congdon, No. 127, premium	9 50
September 13, A. Borchell, No. 128, premium	1 00
September 13, M. L. Trester, No. 129, premium.....	2 00
September 13, E. L. & I. Bowman, No. 130, premium	2 00
September 13, D. H. Dyer, No. 131, premium	1 00
September 13, L. E. Upton, No. 132, premium	1 00
September 13, Mrs. I. N. Clark, No. 133, premium	3 00
September 13, O. Anderson, No. 137, premium.....	1 50
September 13, J. C. Preutzer, No. 138, premium	1 00
September 13, P. F. Thomas, No. 138½, premium	50
September 13, Mrs. McCall, No. 139, premium.....	2 00
September 13, R. N. Day, No. 140, premium	5 00
September 13, M. Scott, No. 141, premium.....	1 00
September 13, Annie Blair, No. 142, premium	2 00
September 14, J. A. Bailey, No. 143, labor	1 50
September 14, S. B. Haines, No. 144, labor.....	22 50
September 14, J. H. Jensen, No. 145, labor	18 00
September 14, D. C. Mosher, No. 146, labor.....	27 00
September 14, Mrs. Latta, No. 147, muslin.....	1 00
September 17, Smith & Seely, No. 148, printing.....	18 25
September 17, Geo. E. Jenkins & Co., No. 149, ribbons ...	4 50
September 18, Funke & Ogden, No. 150, plates	20 30
September 18, Korsmeyer & Co., No. 151, hose, etc.....	15 90
September 24, Herpolsheimer & Co., No. 152, muslin	6 14
September 26, State Journal Co., No. 153, printing	21 20
September 27, L. Bruner, No. 154, electro.....	13 25
October 25, C. H. Frey, No. 155, labor.....	2 00
October 25, State Journal Co., No. 156, printing, 1888	23 95
October 25, G. J. Carpenter, No. 157, salary.....	41 00
October 26, Geo. Cross, No. 158, printing.....	5 00

TREASURER'S REPORT.

35

November 19, G. J. Carpenter, No. 159, salary	\$42 00
December 4, Geo. Cross, No. 160, printing	7 00
December 12, R. S. Graham, No. 161, stamps.....	20 00
December 16, Mrs. V. H. Dyer, No. 162, premium.....	1 00
December 16, G. J. Carpenter, No. 163, salary.....	42 00
December 16, R. S. Graham, No. 164, stamps.....	10 00
December 16, D. C. Mosher, No. 165, labor	3 00
1890.	
January 4, R. S. Graham, No. 166, stamps.....	5 00
Total issued.....	<u>\$2606 70</u>

TREASURER'S REPORT.

THE NEBRASKA STATE HORTICULTURAL SOCIETY,

In account with PETER YOUNGERS, JR.

To balance on hand January 15, 1889	\$2170 10
Cash received from Samuel Barnard, January 17	124 00
Cash received from G. J. Carpenter, January 18.....	11 00
Cash from State Treasurer, September 10	2000 00
Cash from Agricultural Society, November 7	1000 00
	<u>\$5305 10</u>
Warrants cashed (as per list).....	2599 95
	<u>\$2705 15</u>
Balance on hand	\$2705 15

(Signed)

PETER YOUNGERS, JR., *Treasurer.*

By Warrants paid—

No. 1.....	\$41 36
No. 2.....	30 00
No. 3.....	20 00
No. 4.....	5 00
No. 5.....	38 50
No. 6.....	10 00
No. 7.....	6 50
No. 7, (Series 1884)	2 75

By Warrants paid—

No. 8.....	\$51 50
No. 9.....	1 50
No. 10.....	29 50
No. 11.....	12 00
No. 12.....	20 00
No. 13.....	50
No. 14.....	3 00
No. 15.....	12 50
No. 16.....	3 00
No. 17.....	1 00
No. 18.....	8 00
No. 19.....	7 25
No. 20.....	40 00
No. 21.....	9 00
No. 22.....	2 90
No. 23.....	2 50
No. 24 $\frac{1}{2}$	2 25
No. 24.....	22 50
No. 25.....	85 00
No. 26.....	2 25
No. 27.....	40 00
No. 28.....	43 00
No. 29.....	7 00
No. 30.....	42 00
No. 32.....	41 00
No. 33.....	5 00
No. 34.....	20 00
No. 35.....	8 50
No. 36.....	10 00
No. 37.....	9 00
No. 38.....	8 00
No. 39.....	6 00
No. 40.....	42 00
No. 41.....	8 25
No. 42.....	9 00
No. 43.....	12 00
No. 44.....	5 00

By Warrants paid—

No. 45.....	\$3 00
No. 46.....	1 00
No. 47.....	21 00
No. 48.....	26 00
No. 49.....	30 00
No. 50.....	3 00
No. 51.....	2 00
No. 52.....	27 00
No. 53.....	33 00
No. 54.....	5 00
No. 55.....	45 00
No. 56.....	1 00
No. 57.....	1 00
No. 58.....	2 00
No. 59.....	1 00
No. 60.....	2 00
No. 62.....	98 00
No. 63.....	1 00
No. 64.....	27 00
No. 64 $\frac{1}{2}$	2 00
No. 65.....	30 00
No. 66.....	2 00
No. 67.....	4 00
No. 68.....	2 00
No. 69.....	10 00
No. 70.....	3 00
No. 71.....	1 00
No. 72.....	2 00
No. 73.....	20 00
No. 74.....	56 00
No. 75.....	112 00
No. 76.....	4 00
No. 77.....	2 00
No. 77, (Series 1888).....	1 00
No. 78.....	4 00
No. 79.....	37 00
No. 80.....	70 00

By Warrants paid—

No. 81.....	\$15 00
No. 82.....	125 00
No. 83.....	82 00
No. 84.....	13 00
No. 85.....	72 00
No. 86.....	17 00
No. 87.....	19 00
No. 88.....	3 00
No. 89.....	4 00
No. 90.....	1 45
No. 91.....	2 00
No. 92.....	101 00
No. 93.....	3 00
No. 94.. ..	6 00
No. 95.....	6 00
No. 96.....	2 00
No. 97.....	24 00
No. 98.....	24 00
No. 99.....	24 00
No. 100.....	1 00
No. 101.....	6 00
No. 102.....	12 00
No. 103.....	32 50
No. 104.....	23 50
No. 105.....	12 00
No. 106.....	3 00
No. 107.....	1 00
No. 108.....	11 50
No. 109.....	17 00
No. 110.....	4 50
No. 111.....	12 50
No. 112.....	1 50
No. 113.....	1 00
No. 114.....	6 00
No. 115.....	6 50
No. 116.....	50
No. 117.....	2 00

By Warrants paid—

No. 118.....	\$0 50
No. 119.....	1 00
No. 120.....	12 50
No. 121.....	2 00
No. 122.....	6 00
No. 123.....	3 00
No. 124.....	1 00
No. 125.....	1 00
No. 126.....	2 00
No. 127.....	9 50
No. 129.....	2 00
No. 130.....	2 00
No. 131.....	1 00
No. 132.....	1 00
No. 133.....	3 00
No. 137.....	1 50
No. 138.....	1 00
No. 139.....	2 00
No. 140.....	5 00
No. 141.....	1 00
No. 142.....	2 00
No. 143.....	1 50
No. 144.....	22 50
No. 145.....	18 00
No. 146.....	27 00
No. 147.....	1 00
No. 148.....	18 25
No. 149.....	4 50
No. 150.....	20 30
No. 151.....	15 90
No. 152.....	6 14
No. 153.....	21 20
No. 154.....	13 25
No. 155.....	2 00
No. 156.....	23 95
No. 157.....	41 00
No. 158.....	5 00

By Warrants paid—

No. 159.....	\$42 00
No. 160.....	7 00
No. 161.....	20 00
No. 163.....	42 00
No. 164.....	10 00
No. 165.....	3 00

Total warrants paid\$2599 95

(Signed)

PETER YOUNGERS, JR., *Treasurer.*

January 15, 1890.

REPORTS OF COMMITTEES AT WINTER MEETING.

REPORT OF COMMITTEE ON SECRETARY'S AND TREASURER'S REPORTS.

(Messrs. Reed, Hesser, and Alexander.)

Chairman Reed, speaking for the committee, said :

Mr. President and Members of the Nebraska State Horticultural Society: Your committee find the Treasurer's report correct and vouchers are shown for all moneys paid.

The Secretary's report is also found to be correct as read before the Society.

REPORT OF COMMITTEE ON LEGISLATION.

(Carpenter, Day, and Stephens.)

G. J. Carpenter, chairman, spoke as follows :

Your committee met at Lincoln to ask the Legislature for a larger appropriation, when we were confronted by House Roll No. 274, of which I have a copy in my hands ; shall I read it ? (Voice: "Read it.") (Reads.)

LEGISLATURE OF NEBRASKA—TWENTY-FIRST SESSION.

House Roll No. 274.

A Bill for an act to amend section six (6) of chapter two (2), entitled "Agriculture," and to amend an act entitled "An act to amend sections four (4), six (6), and nine (9), of chapter two (2) of the Compiled Statutes of Nebraska, and to repeal said original act approved March 24, 1887, and to provide for the permanent establishment of a horticultural society in the state of Nebraska.

Introduced by Mr. Berry. Read first time January 25, 1889. Ordered to reading. Read second time January 26, 1889. Referred to Committee on Agriculture. Sent to printer January 26, 1889.

Be it enacted by the Legislature of the State of Nebraska: That said acts and sections referred to in the title of this act be amended so as to read as follows :

" There is hereby established a horticultural society for the state of Nebraska, consisting of the following named persons : R. W. Furnas, J. H. Masters, S. Barnard, W. J. Hesser, Hiram Craig, E. M. Grennell, E. Beaver, J. W. Masters, Christ Hartman, D. H. Wheeler, W. R. Harris, E. C. Erfling, W. R. Bowen, J. P. Dunlap, R. H. Davey, H. L. Smith, and B. D. Slaughter.

SECTION 2. The annual meeting of said State Horticultural Society shall meet at the capital of the state on the first Tuesday after the second Monday in January of each year for the purpose of deliberating and consulting as to the wants, conditions, and prospects of the horticultural interests of the state.

The secretary of said horticultural society shall make an annual report to the governor embracing the proceedings of the society, with a bill of items showing for what purposes any money was expended by said society are appropriated for its use was paid out for the past year.

Also the general conditions of the horticultural interests throughout the state, together with essays, statement of facts and recommendations as the society may deem useful, together with a list of fruit trees profitable to set in said state, which report, not exceeding 300 pages of printed matter, shall be printed annually by the state printer, and not to exceed 5,000 copies thereof, to be bound in cloth covers and be delivered to the secretary of state, accounts thereof to be audited as other accounts for state printing are audited, and paid out of any money appropriated for legislative printing.

That the report of the board of the State Horticultural Society, or so much thereof as will not exceed 300 pages of printed matter, to be designated by the president and secretary, shall be printed annually by the state printer, and 5,000 copies thereof, bound in cloth covers and delivered to the secretary of state, the account thereof to be audited as other accounts for state printing are audited and paid out of the money appropriated for legislative printing.

That the membership of said society shall consist of life members and the annual membership to consist of the officers of the county horticultural societies organized in the state of Nebraska. The officers of said county horticultural societies shall be annual members of the State Horticultural Society by virtue of their office.

SEC. 2. That any person may become a life member of said society upon the payment to the treasurer thereof the sum of \$10.

That on the first Tuesday in July after the passage of this act, the persons named herein and such others as may have become life members or annual members by compliance with the terms of this act,

shall meet at the capitol in the city of Lincoln, and elect a president and secretary and board of directors, consisting of not less than seven members, which seven members shall constitute a board of directors, who will take their office at the winter meeting next following.

SEC. 3. There shall be appropriated for the promotion of agriculture and horticulture, and delivered to the society herein organized, the sum of \$1,000 annually in exclusion of all other appropriations provided for by law for agricultural purposes.

SEC. 4. That chapter one (1) of an act to amend sections four (4), six (6), and nine (9) of chapter two (2) of the Compiled Statutes of Nebraska, and to repeal said original act, approved March 24, 1887, be, and the same is hereby, repealed.

Your committee saw that the passage of this bill would be destruction to our Society, and would cause enough dissensions to materially cripple the horticultural interests of the state, so we met three times and succeeded in getting the Legislature to pass a substitute bill, by provisions of which we now receive annually \$2,000.

REPORTS OF COMMITTEES ON REVISION OF PREMIUM LIST.

REPORT OF COMMITTEE ON CLASS I.

Mr. President: Your Committee on Revision of Class I, 'Green Fruits, beg leave to offer the following changes, omissions, and additions for your consideration :

Lot 2—Change first premium on county exhibits from \$40 to \$50 ; second premium from \$30 to \$35.

Lot 3—Change premiums on Nebraska-grown autumn apples from \$12, \$8, and \$5 to \$10, \$7, and \$5. Change premiums on seedling apples from \$5 and \$3 to \$3 and \$2. Add best plate of five specimens each of the following varieties: Wealthy, Dyer, Saxton, Early Pennock, Calvert, and Chenango Strawberry, with premiums of \$2 and \$1 each, first and second premiums respectively.

Lot 4—Change premium on Nebraska-grown pears from \$3 and \$2 to \$15, \$10, and \$5. And premiums of \$2 and \$1, first and second respectively, for plates of five specimens of the following varieties: Flemish Beauty, Bartlett, Clapp's Favorite, Seckel, Duchess D'Angouleme, Keiffer, and Louise Bonne de Jersey.

Lot 5—Add premiums of \$2 and \$1 for the best plate, five specimens, budded peaches, any variety, and for best plate seedling peaches.

Lot 6—Add best plate, five specimens, any variety plums, \$2 and \$1.

Lots 7, 8, and 9—Incorporate in one lot, called Lot 7—Apricots, Quinces, and Prunes, with the premiums same as before.

Lot 10—changed to Lot 8. Change county exhibit to read: "Best collection, twenty varieties apples, county exhibit, \$20, \$10, and \$5," instead of \$15 and \$10. Omit premium of \$1 and 50 cents on any new and meritorious variety not before mentioned, and add Lot 9—Discretionary. The sum of \$50 is hereby set apart to pay premiums on any new or valuable fruit not mentioned in Classes 1 and 2.

The committee will report exhibits that are worthy of premiums and the Board of Directors will designate the amount of premiums, and order the same paid. (Signed)

PETER YOUNGERS, JR.

D. U. REED.

R. N. DAY.

REPORT OF COMMITTEE ON CLASS 2.

Mr. President: We, your Committee on Class 2, beg leave to make the following report:

Lot 1—Grapes, has been referred to another committee who will make it a class of itself, changing our Class 2 to Class 3—Preserves, Pickles, and Canned Fruit, and changing the lots from 2, 3, 4, and 5 to 1, 2, 3, and 4, respectively.

Lot 1—Canned Goods—The following additions are made: Canned Apricots, Apples, Grapes, Currants, String Beans, Sugar Corn, and Rhubarb, with premiums of \$2 and \$1 on each. Canned Quince is stricken from the list.

Lot 2—Preserves. The following additions are made: Preserved Apples, Cherries, Gooseberries, Strawberries, Raspberries, Currants, Apricots, Blackberries, and Citron; Raspberry, Blackberry, and Grape jam, with premiums of \$2 and \$1 each. The following is stricken from the list, Quince preserves.

Lot 3—Jellies—The following additions are made: Gooseberry, Currant, Blackberry, Raspberry, and Strawberry jelly, with premiums of \$2 and \$1 each.

Lot 4—Pickles. We would add Pickled Crab Apples, Pears, Gherkins, and Peppers, with premiums of \$2 and \$1 each.

We would further recommend that the Secretary allow no entries to be made in this class except in accordance with the list.

J. A. GAGE.

R. N. DAY.

A. J. BROWN.

REPORT OF COMMITTEE ON CLASS 3.

Mr. President: Your committee beg leave to present as their report the following revised list of premiums for old Class 3, now known as Class 4—Floral. [See Premium List, Class 4.]

(Signed)

W. J. HESSER.

D. C. MOSHER.

REPORT OF COMMITTEE ON RULES AND REGULATIONS.

Mr. President: Your committee would advise changing the word "Saturday," in first sentence of Regulations, to "Monday," and omitting the word "flowers," in the tenth Regulation, allowing the special rules in Class 4 to govern the arrangement of flowers in groups, as what is practicable with fruit and canned goods will not apply to the florist's products.

E. F. STEPHENS.

G. J. CARPENTER.

PETER YOUNGERS, JR.

W. J. HESSER.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Mr. President: Your committee to whom was referred the Address of the President, after discussing the same, and having the suggestions under contemplation, have come to the following conclusions :

1. Regarding the salaries of our officers, we think we should bear in mind that in the discussion before the Committee on Agriculture, in the last legislature, we made it one of the points in favor of the Society that we would be very careful in our expenditures of public moneys entrusted to us; that we should make the money, which was placed in our hands, do the utmost good to the state and Society in legitimate work and not in salaries and unnecessary expenses. Hence your

committee would coincide with the suggestions of your President that salaries of officers remain the same as at present.

2. Regarding the question of traveling expenses for directors, your committee feel that there are enough wide awake horticulturists in the state who will be regardful of the interests of the Society, who will do the work of that character, and will be willing to pay their traveling expenses out of their own pockets, as heretofore, and that moneys we have should be expended in other directions.

3. As to the question of establishing experiment stations. This is a kind of work which your committee feel to be of the highest importance, and that it ought to be taken hold of in a practical way as rapidly as the Society's funds may warrant. We have regretted that the state farm was not able to do work of this character, in much the same manner as they are doing it in other states. Inasmuch as this is not being done to any great extent in horticulture, there is the more urgent reason why the Society itself should have horticultural stations in different portions of the state, to do the work that is being done in Iowa by their scattered experiment stations. We think the sum named by the President—\$100—is very much too small for a beginning.

In making the argument before the agricultural committee in the last Legislature, your Legislative Committee urged that work of this character should be planned by the Society for the future, and that if funds were given for the proper management of the work, that it would be extended in a brief time, and as rapidly as the funds given would justify.

After considerable discussion your committee is of the opinion that we should have from five to ten stations to commence with, and these to be under the control of the Executive Board of our Society with so much of the sum of \$500 as could in the judgment of the Board be used advantageously. We would place this under the disposition of the Executive Board as the most suitable for the intelligent and economical handling of this money.

4. Regarding the meetings of the Society, while there are special reasons why the meeting should be moved from city to city, yet there are other reasons which we think are competent for retaining the meetings at Lincoln in the winter all the time. One reason we suggest is that railroad travel is more convenient to the capital than in

most other towns; hotel accommodations are good; very pleasant rooms are always afforded us by the University, and we think possibly more people on the whole will attend the winter meetings at the capital than at any other town. The summer meetings, since the work is largely out of doors, should be spent in the examination of crops, fruits, and for social intercourse, should, as has been so wisely inaugurated, be moved from town to town as the Society may vote at its meetings.

5. In regard to the \$2,000 which the President mentions as having been paid to the Society and for which we feel grateful to the Legislature, we think this should be regarded rather in the light of a trust to be expended for future experimental work of the character we have been discussing than that we should feel as though we ought to expend it for premiums or in the ordinary running expenses of the Society. We think that this fund was given to us largely with the expectation that we would do work in opening experiment stations and other work of like character which will tend to advance the horticultural interests of the state and advertise us more widely abroad.

6. The Secretary's is an office of a peculiar character and if performed very acceptably the experience gained each year might make it desirable to retain him in office from year to year. We notice that states having found a good secretary retain him in office sometimes many years.

7. Regarding the time when your Secretary should issue his report to the press. While there are many reasons for favoring the present idea of having this given to the printer for publication after the winter meeting, yet under the present circumstances, now that the work of the winter meeting of 1890 only is before him, there would not be sufficient for the Secretary to use to make up a report of 300 pages. If the report be given to the printers by the middle of February and it took as long to get at it as to get this report, and it probably would, the report would be ready about the middle of May, which is a very busy time of year. The general public, for whom these reports are intended, would not be as much benefited by receiving the report in the early summer as they would by getting it early in the winter, for it is during the winter season that the general public will be benefited by the perusal of our report. The committee would suggest that the time for publication of the report be the same as now.

8. Regarding the question of a building. While your committee realize the importance of more room and more light and better facilities for the proper showing of horticultural and floral products, yet we feel that the city which gains the location of the fair for the next five years ought to provide suitable buildings for the proper display of our agricultural and horticultural products and if the proper pressure is brought to bear upon them that we may expect to be provided with the proper buildings for the display of our horticultural and floral products.

9. Regarding the question as to whether premiums should be paid to exhibitors who come from out of the state, with flowers or fruit, your committee recommend that while we courteously afford every possible opportunity in our power to orchardists and florists to enable them to advertise their products, yet the best places for exhibition and all money be given to flowers and fruits grown in our own state. This we think will tend to increase our home exhibits and do us more good than to give any portion of our premiums to exhibitors from other states.

All of which is respectfully submitted.

(Signed)

E. F. STEPHENS.

E. A. ALLEN.

REPORT OF COMMITTEE ON SUMMER EXHIBIT.

Mr. President and Members: Your Committee on Exhibits find as follows :

R. N. Day, Tekamah ; twelve plates nice apples.

C. S. Harrison, Franklin ; samples Colorado evergreens and ever-green seeds.

W. J. Hesser, Plattsmouth ; twenty-one plates apples ; 125 pots green house plants, consisting of tracenias and palms, three varieties tracenias and twenty of palms ; one cocoanut palm ; one Cycas Revoluta ; one Regia seven feet high.

E. E. Sanborn, nine plates apples.

E. F. Stephens, Crete, fine display of pears, apples, crabs, and grapes.

W. D. Marshall, sample of Lucretia dewberry in alcohol.

Your committee consider this a very worthy exhibit and make

special mention of Mr. Hesser's as deserving more than passing notice and we recommend a premium of \$5 to be paid him.

(Signed)

D. U. REED.

G. W. ALEXANDER.

C. G. LAING.

REPORT OF COMMITTEE ON NECROLOGY.

Mr. Carpenter, chairman of the committee, spoke as follows :

Ladies and Gentlemen, Members of the Nebraska State Horticultural Society: The much dreaded enemy—Death—has again invaded our ranks and plucked the ripest sheaf, not only from our society, but from nearly all the leading horticultural societies of this country and Europe—for Patrick Barry was known and honored wherever advanced horticulture exists; and no other man will be more sadly missed; for, although he had passed over the allotted time that men live by several years, his mental faculties were as bright at the time of his death as they were when he first entered the ranks, over fifty years ago. Even to his very last hours he took an active interest in the pursuit he had so successfully followed through life. It mattered not in which line he labored, whether as editor, author, or nurseryman, he was the very soul of honor.

The knowledge that a tree, a shrub, or flower came from his nursery was always a sufficient guarantee of its genuineness.

As a horticultural writer few equalled and none surpassed him; as a collector of trees, plants, and shrubs he had no peer. At the time of his death he had the finest private collection in America. No true horticulturist could ask a more noble monument than his arboratum—which alone shows his greatness.

As a financier he was a success, as he left one of the largest fortunes in western New York. To him, more than to any other, does Rochester owe her beauty and prosperity, and in his death she loses her noblest son and horticulture its greatest leader.

The Committee on Resolutions on the death of Hon. Samuel Barnard reported as follows :

WHEREAS, The Honorable Samuel Barnard dropped dead on boarding the train at Lincoln to return to his home after attending a meeting of the Nebraska State Horticultural Society ; and

WHEREAS, Mr. Barnard has been one of the most persistent and untiring members of the Society from its organization to the present time, and has so completely won the confidence and respect of the Society that he has for many years held the most important positions of honor and trust in the gift of the Society, therefore be it

Resolved, That we most sincerely regret and deplore the very sudden and untimely death of our associate and very efficient co-worker in horticulture ; and be it further

Resolved, That we most heartily extend our sympathy and condolence to the family of Mr. Barnard for their very great and untimely bereavement.

R. N. DAY.

J. H. MASTERS.

E. F. STEPHENS.

W. R. HARRIS.

SAMUEL BARNARD.

BORN 1837—DIED 1890.

[Read before the Farmers' Institute at Table Rock, Nebraska, January 30, 1890, by M. H. Marble.]

A well known writer has said, "The man who makes two blades of grass grow where only one grew before is a public benefactor." Viewing it in this light, our friend who has so suddenly passed from amongst us must ever be considered as a benefactor, not only to his neighbors, but to his fellow citizens of the state at large. He was ever ready to lend a helping hand to all projects calculated to ameliorate the human race. He had been a familiar figure in our agricultural and horticultural councils for nearly a score of years. The following tribute is paid to him by the *Lincoln Journal*: "Mr. Barnard was a man of ability and integrity. He stood foremost among the people of Pawnee county in encouraging all things, making good society and good citizenship. He was one of the pioneers in fruit growing west of the Missouri river. His service to that industry in this state has been so great that the history of fruit culture in Nebraska will not be complete without extended notice of the labors and triumphs of Samuel Barnard, of Table Rock." And the following from the *Tecumseh Journal*: "Mr. Barnard was one of the best known horticulturists in the state, having devoted the better part of his life to the raising of trees, etc. He attended our institute two weeks ago and looked in his usual health, but complained to a friend that he expected to be called off at any time by heart trouble. A good man at rest."

Mr. Barnard was a member of the state Legislature of 1879, and was active in working for what he considered to be the interests of his constituents.

Samuel Barnard was born in 1837, in Montgomery county, Ohio, of Quaker parentage. He came to Illinois with his parents in 1840, and settled at Bloomington. His father died when he was six years old, and his mother when he was eight. He was educated at the Jubilee college, and at Eureka, in 1859, he married Miss Anna C. Hoover, of Lacon, Illinois. He resided with his family at Bloomington until the breaking out of the war of the rebellion, when he enlisted in the Ninety-fourth Illinois Volunteers, and served until 1864, when he had a stroke of paralysis, when he came home on a furlough. After partially recovering he returned to his regiment, when he was discharged on account of disability, and not subject to re-enlistment. From Bloomington he removed to Forrest, Illinois, and settled on a farm, where he remained four years. Then, with his brother, he built a woolen mill and began the manufacture of yarn and woolen goods at Fairbury, Illinois, but owing to the depreciation in prices of such goods at the close of the war, it took but three years to sweep away all he had. In 1870 he came to Pawnee county, Nebraska, and in 1871 he removed his family here, his future home. He was the youngest of eleven children, of whom two died in infancy, and nine grew to manhood and womanhood—six boys and three girls. Two brothers and two sisters survive him. One brother and sister reside in California, and one brother and sister reside in Bloomington, Illinois. He had three children, two sons and one daughter, who all reside in and near Table Rock and survive him together with his wife. Two years since he had a second stroke of paralysis while absent in California. Thursday, Jan-

uary 16th, came the sad and sudden ending, so familiar to us all it need not be repeated here. The lightning flashed forth the message which suddenly darkened thousands of homes with a shadow which no sun rays seemed able to penetrate. And if a thousand homes, what shall we say of the one where was his family awaiting his arrival instead of the cruel message?

A desire to help others was always one of the governing motives of his actions. The humanity of his soul was manifest as much in his business relations as elsewhere. His life habits of untiring industry would not allow him to entertain any thoughts of rest, although for some time it had been quite apparent to those about him that such was the absolute demand of nature if his life was to continue long. His home was his life where he enjoyed the society of his family and friends. His success in life was doubtless due to the fact that his heart was in the work.

No man could be more hospitable than was Samuel Barnard, must be the verdict of all who knew him. To him is our town indebted for the fine appearance of our public square. Every tree thereon was given by him. Would it not now be a grateful tribute to his memory to let it be known hereafter as "BARNARD PARK"?

It must have been of such a person as he of whom the poet wrote the following lines, which would not be an inappropriate epitaph for our large-souled friend whom we sadly miss from our councils to-day:

"Abou Ben-Adhem—may his tribe increase—
Awoke one night from a sweet dream of peace,
And saw within the moonlight of his room,
Making it rich like a lily in bloom,
An angel writing in a book of gold!
Exceeding peace had made Ben-Adhem bold;
And to the vision in the room he said,
'What writest thou?' The vision raised its head
And, with a look made of all sweet accord,
Answered, 'The names of those who love the Lord.'
'And is mine one?' said Abou. 'Nay, not so,'
Replied the angel. Abou spake more low,
But cheerily still, and said, 'I pray thee then
Write me as one who loves his fellow men.'
The angel wrote and vanished. The next night
It came again with a great wakening light,
And showed the names which love of God had blest;
And lo! Ben-Adhem's name led all the rest!"

TABLE ROCK, NEBRASKA, January 29, 1890.

RESOLUTIONS.

WHEREAS, We have heard there was a disposition among certain of our western congressmen to encourage the repeal of the timber-culture law, on the ground that such law is impracticable, and that the difficulties of successfully planting the timber are too great, we would respectfully urge upon them that, in the experience of practical foresters of the west, the difficulties of raising timber in any portion of the public domain, east of the Rocky mountains, are not insuperable, when met by painstaking and thorough work, and judicious selection of varieties. We urge that the timber-claim law be allowed to remain in force, needing only such judicious amendment as shall make its requirements and conditions more in accord with the original intent of the act.

(Adopted at winter meeting, 1890.)

REPORT OF COMMITTEE ON FINAL RESOLUTIONS.

Resolved, That the success of the summer meetings of this Society, both in point of numbers in attendance and in the interest and cordiality manifested by the people of the community, is such as to warrant their continuance in the future.

Resolved, That this Society request the co-operation of the State Experiment Station in the establishment of the Horticultural Experiment Stations provided for at the last annual meeting.

Resolved, That our Secretary be instructed to convey the heart-felt thanks of this Society to the Local Reception Committee, the Crete band, the Adelphian Quartette, the Cosmopolitan hotel, the railroads, and the citizens in general, for contributing so largely to the pleasure and profit of this meeting. (Signed) R. N. DAY.

PETER YOUNGERS, JR.

CHARLES E. BESSEY.

Inasmuch as the state Legislature has submitted the question of license or the prohibition of the liquor traffic, to be settled at the next state election, and

WHEREAS, Arguments will be made claiming that prohibition will be detrimental to the interests of horticulturists, we therefore, at this meeting of the Nebraska State Horticultural Society, heartily en-

dorse the principle of prohibition, and favor its adoption in the state constitution as against license, without regard to party affiliation.

(Adopted at winter meeting, 1890.)

WHEREAS, The serious ravages of our insect enemies claim our attention, we therefore respectfully urge upon the Regents of the State University, in their experiment station work, to make entomology more prominent with special attention to such insects as are injurious to horticulture.

(Adopted at winter meeting, 1890.)

WHEREAS, The present method of free seed distribution as practiced by the Department of Agriculture is not productive of enough good to warrant the expense : therefore be it

Resolved, That the Nebraska State Horticultural Society request the members of congress from Nebraska to use their influence to have the aforesaid system abolished.

(Adopted at winter meeting, 1890.)

WHEREAS, The establishment of an experiment station in the state of Nebraska, by the general government at an expense of \$15,000 per year, was for the purpose of investigation and experimentation in the interests of agriculture; and

WHEREAS, The live stock interests of Nebraska are of the greatest importance to the people of the state, and as our owners of live stock suffer more or less each year by reason of diseases among said live stock : therefore be it

Resolved, That the Experiment Station of the state of Nebraska will serve the agricultural interests of the state in the highest degree by continuing the investigation in regard to diseases of domestic animals, and for the purpose of such investigation the best talent obtainable should be employed by those having said Experiment Station in charge.

(Adopted at winter meeting, 1890.)

Resolved, That a committee of three (3) be appointed by the President, to act in conjunction with the State Dairymen's Association of Nebraska, and such other state organizations as may determine to act likewise to provide a system of state farmers' institutes in Nebraska.

(Adopted at winter meeting, 1890.)

CORRECTED FRUIT LIST BY DISTRICTS.

REPORT OF COMMITTEE.

Southeastern District.

The southeastern district to be constituted of the following counties : Polk, Butler, Saunders, Cass, Lancaster, Seward, York, Hamilton, Clay, Fillmore, Saline, Gage, Johnson, Otoe, Nemaha, Richardson, Pawnee, Jefferson, Thayer, Nuckolls, and the following list of fruits recommended by the committee :

Apples for general planting, summer list—Red June, Red Astrachan, Duchess, Cooper E. White, American Summer, Pearmine, Cole's Quince, Sweet June.

Autumn list —Wealthy, Fall Winesap, Maiden's Blush, Utters.

Winter list —Ben Davis, Winesap, Jonathan, Janet, Grimes' Golden, Walbridge.

Recommended for trial — Dyer, Calvert, Plum's Cider, Day, Missouri Pippin, Winter Wine, Otoe, Iowa Blush, Yellow Transparent.

Crab apples—Hyslop, Whitney No. 20, Alaska ; Golden Beauty recommended for trial.

All the varieties recommended in the southeastern district are recommended for trial in the southwestern district.

Northeastern District.

The northeastern district to consist of the counties of Sarpy, Douglas, Washington, Dodge, Colfax, Platte, Burt, Cuming, Stanton, Madison, Antelope, Holt, Pierce, Wayne, Dakota, Dixon, Cedar, Knox, and the following list is recommended :

Apples for general planting—Red Astrachan, Duchess, Wealthy, Utters, Plum's Cider, Day, Jonathan, Janet, Winesap, Iowa Blush, Walbridge.

List for trial—Red June, Cooper E. White, Sops of Wine, Sweet June, Dyer, Fall Winesap, Calvert, Ben Davis, Missouri Pippin, Otoe, Cole's Quince.

Northwestern District.

Embracing the following counties: Sheridan, Valley, Keya Paha, Cherry, Custer, Brown, Box Butte, Sioux, Dawes, Cheyenne, Thomas, Grant, Arthur, McPherson, Logan, and the portion of Keith and Lincoln lying north of the Platte.

Apples recommended for trial—Duchess, Red Astrachan, Alexander, Wealthy, Walbridge, Iowa Blush, Yellow Transparent.

Central District.

Includes the following counties: Hall, Buffalo, Dawson, Custer, Sherman, Howard, Merrick, Nance, Greeley, Valley, Boone, Wheeler, Garfield, Loup, Blaine.

Apple list recommended for trial—Red June, Red Astrachan, Cole's Quince, Wealthy, Utters, Plum's Cider, Day, Ben Davis, Winesap, Iowa Blush, Walbridge.

Western District.

Includes: Webster, Franklin, Harlan, Furnas, Red Willow, Hitchcock, Dundy, Chase, Hayes, Frontier, Gosper, Phelps, Kearney, Adams, and that part of Keith and Lincoln lying south of the Platte.

Apple list for trial—Duchess, Red Astrachan, Alexander, Snow, Wealthy, Walbridge, Iowa Blush, Ben Davis, Winesap.

Other Fruits.

Grapes recommended for southeastern, southwestern, and northeastern districts—Concord, Perkins, Martha, Moore's Early, Worden, Elvira, Lady. For trial—Lady Washington, Pocklington, Goethe, Agawam, Jefferson, Grove's Seedling, Early Victor, Empire State, Vergennes.

The above list is recommended in the central, western, and northwestern districts for trial only.

Currants—Red Dutch, White Grape, Versailles, Long Bunch Holland, Victoria, Fay's Prolific.

The above list is recommended for the entire state.

Blackberries—Snyder recommended for general planting. For trial—Agawam, McCracken.

Raspberries recommended for southeastern and northeastern districts:

Black Caps — Tyler or Souhegan, Gregg, and Hopkins.

Red Raspberries — Turner, Cuthbert.

For trial — Shaffer's Colossal, Ohio.

All the above list is recommended for trial only in southwestern, central or western, and northwestern districts.

The dwarf Juneberry is recommended for general cultivation.

Strawberries recommended in southeastern and northwestern districts — Crescent, Charles Downing, Miner, Mount Vernon, Cumberland, Captain Jack, Pipër's Seedling.

For trial — James Vick, Jessie, Bubach.

All the strawberries are recommended for trial in all of the older districts of the state.

Pears recommended for trial only, in all parts of the state — Swan's Orange, Early Harvest, Flemish Beauty, Louise Bonne, Vicar, Lawrence, Clapp's Favorite.

Peaches recommended for trial only, in all parts of the state — Hale, Crawford's Early, York, Troth, George IV., Smock, Crawford's Late, Wood's Late, Morris' White, Beatrice, Amsden, Alexander, Newington, Jacques, Heath Cling, Louise, Rivers, Mixon.

Plums recommended for the southeastern and northeastern districts — Miner, Wild Goose, Forest Garden.

For trial — De Soto, Wolf, Prunus Simonii, Pottawattamie, Blue Damson.

The above plums are recommended for trial in the southwestern northwestern, central, and western districts, as we have no report from said districts.

Russian apricots are recommended for southern half of Nebraska.

Cherries recommended for the southeastern and northeastern — Early Richmond and English Morello.

Recommended for trial — Reine Hortense, Bell Magnifique, Olivet, Dye House, Ostheim, Wragg.

All of the above are recommended for trial in central, southwestern, western, and northwestern districts.

For a commercial orchard — Cooper E. White, Duchess of Oldenberg, Cole's Quince, Wealthy, Utter, Ben Davis, Winesap, Jonathan, Missouri Pippin, Winter Wine, Janet, Grimes' Golden Pippin.

The above are recommended for profit wherever they succeed in the state.

REPORTS OF DISTRICT DIRECTORS.

Morning session of January 16, 1890.

After calling the meeting to order, President Taylor asked for the report of the director of the southeastern district, Samuel Barnard.

BARNARD—Mr. President, I have no written report to offer, but will state as briefly as possible what I know in regard to fruit growing in the southeastern district.

I sent out a good many blanks to prominent fruit growers, but received only a few replies; the method seems to be no good, and we must adopt some other if we wish to get any satisfactory reports.

This has been a year of profit in fruit growing in quantity, quality, and price. Whoever has had fruit has made money, and who has had no fruit can ascribe his failure to neglect.

As I have said before, the Society must adopt some other means of obtaining reports, and I would suggest that it might be a good plan to appropriate money to send men out in the field to collect such statistics as we may see fit to obtain.

REPORT OF DIRECTOR OF THE NORTHEASTERN DISTRICT.

Mr. President, Ladies and Gentlemen, of the Nebraska State Horticultural Society: In making my report for the northeastern district, I will give you some idea of our orchards as I find them in traveling over two or three of the river 'counties. We will take Washington, Burt, Dakota and Dixon counties. Washington having held a foremost rank as a fruit growing county in the state for quite a number of years and probably has some trees that have been in bearing nearly as long as any trees in the state, and some of these old trees seem to be healthy and promise usefulness for years to come. But the majority of the bearing orchards of Washington county and Burt also were planted from twelve to sixteen years ago. J. K. Moulton & Co., of Minneapolis, Minn., and a firm of dealers of Blair, Neb.,

did a very extensive business in furnishing trees at that time. There are quite a number of instances where the trees have been cared for in a manner as becometh good husbandmen; they are now in good bearing and produced the past season an abundance of fruit. Yet as high as the price of apples is this winter the crop failed to be a profitable one from the fact that it matured (a very large majority of it) in the summer and early autumn, and of necessity had to be put upon the market as soon as matured or it went to decay and was lost. This state of affairs caused an oversupply and the price went as low as 25 cents per bushel, and many farmers refused to leave their other pressing work at this season of the year to market apples at so low a price, and quite a large amount of fine fruit went to waste. I found some orchards of from fifty to one hundred trees with not a tree that produced winter apples; others would contain all the way from fifteen to twenty, or thirty crab apple trees, comparatively worthless as far as profit is concerned. Other orchards where several choice varieties of winter apples were ordered, all of which, when they commenced to fruit, bear one variety of summer or fall apples, such as Duchess or Haas. Many of these men are ready to affirm to-day that the orchard business or the business of apple growing is overdone, or that it is a failure as an investment for profit in these counties. Others who have been more successful in getting a better selection of fruits, say one-half or more winter apples, are more encouraged. One man in Washington county with whom I conversed says, tell the farmers that an orchard of five acres of good winter apples, well cared for, is the best investment that they can make. Another man in Burt county, who has ten acres out of three hundred and twenty in orchard, says his orchard pays him more profit than all the balance of his farm, and there is no farm in Burt county better improved or better stocked than this one. Other instances may be mentioned where the orchard is giving remarkably satisfactory returns, but enough; we will let this suffice for the apple orchard and look a little to other fruits.

We have no encouraging word for pears, as the trees seldom attain bearing size, and when they do, one or two years of bearing ends their existence. Peaches are about as uncertain as pears, and last about as long, although the past year there were many bushels of very fair peaches grown in this district. Plums were very nearly a failure in northeastern Nebraska, in 1889, and what few there were that ma-

tured were of very inferior quality. Cherry trees produced the most wonderful crop of fruit that I have ever seen, still the supply was far short of the demand and prices did not fall below ten cents per quart, which I consider very remunerative, and our trees are looking well for further usefulness. Gooseberries were perhaps a good half crop, but nothing more. Blackberries! well! to put it mildly, were simply immense and were richly remunerative to the grower. Old plantations of raspberries did fairly well, more perhaps than half a crop, while young plantations were nearly a failure on account of the dry condition of the soil during the winter and early spring; and strawberries shared a like fate with the new plantations of raspberries. And here let me say that I do not think the prospects for an abundant crop of small fruit the coming season are very flattering in our district on account of the dry condition of the soil.

R. N. DAY, *Director*.

DISCUSSION.

L. A. WILLIAMS, of Iowa—I would ask if it is the rule that young plantations suffer most from the drouth?

DAY—It is with us.

L. A. WILLIAMS, of Iowa—Well, such is not the case with us in Iowa; it is usually the older plantations that succumb first.

HARRIS—The trouble is that Day did not plant his raspberries deep enough; we plant six or eight inches deep, and have no trouble with our young plantations during drouths.

DAY—I plant near the surface, and I believe this to be the right way, as raspberries are not a deep growing plant.

CARPENTER—You can't plant too deep, especially tip plants.

HARRIS—That's right, and you should keep covering them as you cultivate.

REPORT OF THE DIRECTOR OF THE NORTHWESTERN DISTRICT.

ARCADIA, NEBRASKA, January 1, 1890.

For various reasons there are but very few that have fruit trees of any variety in bearing. Where good trees of proper varieties have been planted in ground suitably prepared and then cultivated and cared for as they should be the results have been very satisfactory.

Apples—Prospects very encouraging.

Cherries—Early Richmond, English Morello, and Late Richmond are about all the varieties planted. They are doing well.

Pears—Very discouraging.

Peaches—A few grown the past year, quality poor.* Too uncertain to recommend.

Apricots—Promise to be one of the fruits for our part of Nebraska.

Plums—Do well. The Miner has come into bearing more than any other variety. Wild Goose is reported favorable.

Grapes—We believe the northwestern part of Nebraska is especially adapted to grape culture. All reports are very favorable where vines have had reasonable cultivation.

Black Raspberries—One of our best and surest fruits.

Red Raspberries and Blackberries—Too tender, winter kill very bad; could not recommend for any part of this district.

Strawberries—Do well with reasonable care.

Currants and Gooseberries—Usually produce fair crops of fruit.

Forest Trees—The Box Elder and Ash are planted more than any other variety of trees on timber claims. Black Walnut and Catalpa are next in favor. Gray Willow and Cottonwood have been planted to some extent, but most all who have planted Willow or Cottonwood regret that they did not plant something else.

Russian Mulberry—So far as I can learn the Russian Mulberry is doing well; for hedges and windbreaks it is the best tree we have.

Soft Maple—Does well when properly headed.

Elm—This is one of our native trees and should be more generally planted.

So far as stock, grains, grasses, and vegetables are concerned, I have only to remind you of the fact that Custer county took first premium at State Fair in 1888 and 1889.

The weather was very favorable for ripening the wood, and trees, shrubs, and plants went into winter in good condition.

The following report is from J. M. Snyder, one of the most practical farmers in Sherman county. This statement comes from the Central District, about fifteen miles from its northern boundary. Knowing that the director of the Central District has not received any report from him, I offer it to the Society :

VERDURETTE, SHERMAN CO., NEBR.

W. F. Jenkins, Director Northwestern District: I planted my orchard in 1880, on backsetting and on north slope; wind-break on south and west. Fruited in 1887. The most satisfactory apple so far is the Ben Davis. The tree is healthy, and excels in bearing. The next choice is the Willow Twig. The best blackberry, Snyder. I have no success with Red Raspberries. Cherries, Early and Late Richmond. Late Richmond is the best. The balance of fruits on list I have not satisfactorily tested. I have grown for home use and not for market.

J. M. SNYDER.

MIRA CREEK, VALLEY CO., NEBR., December 15, 1889.

Mr. W. F. Jenkins, Arcadia, Nebr.: DEAR SIR—In reference to Apple trees I will say: In 1880 I planted sixty trees. Ten, all of one variety, died; forty-eight of the balance lived, although the season was very dry. I planted on northern slope, have given trees no special care, yet they have done well and made a rapid growth, except in one corner where I had planted a strawberry bed. There the trees are dead, or nearly so. I find I did not get what I ordered, and I will only mention a few varieties that are fruiting:

The Whitney No. 20 is a thrifty tree, a good bearer, and a good apple.

Red Astrachan has done well.

Early Harvest, not hardy.

Duchess of Oldenberg is a very thrifty tree; fruit very large and smooth.

Maiden Blush has done well; tree, hardy.

Willow Twig—Of all the varieties I have this has done the best. Tree, smooth, very hardy, good bearer, and fruit hangs on well.

Janet has done well.

The Winesap has not done well for me.

I have other varieties that have done well, but am not sure I have the right name.

Strawberries—The Sharpless does well.

Blackberries—Have had no success.

Red Raspberries—Have done no good; winter killed.

Grapes—I have only the Concord; it does well.

Gooseberries—I have Houghton and Downing. The Downing is my choice.

Cherries—Early Richmond has done the best for me.

T. C. HONNOLD.

Mr. Honnold took first premium for best display of fruit at Valley County Fair in 1889.

W. F. JENKINS, *Director*.

DISCUSSION.

PROF. HICKS—I would like to know how much of the northwest is included in the northwest district. Is it the whole northwest?

JENKINS—My report will apply to Custer, Sherman, Valley, and Loup counties, and these take in about all of the northwest in which any fruit is raised.

H. J. WEBBER—Prof. Bessey regrets that he cannot be here with us to-day to discuss the plants and trees in the northwest, but as sickness prevents him, and as I spent six weeks in that region last summer, I shall endeavor to talk a short time on the same subject. We have there more varieties of trees and plants than here. Wild plums, grapes, raspberries, and strawberries are common in all parts of the northwest; the wild grape growing far better than those in the southeast. From a botanical standpoint the northwest will be an excellent country for small fruit growing, as the wild fruits do so well. I saw four varieties of wild currants, two of gooseberries, and in the extreme northwest Juneberries, all of which were well loaded with fruit of good quality. The wild sand cherry there is better than those in central Nebraska. In regard to seasons, all vegetation is earlier in Dawes and Sioux counties than in the central portion of this state. This, I presume, is on account of the "Chinook" winds, which reach the extreme northwest, but do not come to central Nebraska.

DUNLAP—I have tried cultivating the sand cherry; planted some pits, and succeeded in growing some very fine trees, which, when large enough, bore very handsome fruit. We congratulated ourselves that we had an acquisition in the cherry line, but when we tried to eat them, one or two cherries were all we wanted. They were the bit-terest things I ever tried to eat.

WEBBER—How high were those trees you mention?

DUNLAP—Three or four feet.

WEBBER—Maybe they were choke cherries. You are correct re-

garding choke cherries; one or two bites are sufficient if they are that kind. I know the sand cherries are eaten frequently, and relished, too.

PRESIDENT—Perhaps appetite has something to do in this case?

DUNLAP—Yes; it makes quite a difference if one has been eating salt pork and such things.

WEBBER—I think the fruit can be developed. I have no criticism, yet there is room for improvement.

MASTERS—I have tried the sand cherry, but think it is no good. I kept my trees ten years and they bloomed well, but that is about all you could say for them. There would be fifty cherries, where there should have been that many bushels. The fruit is not good to eat; it is a little like “Dead Sea fruit”—pleasant to look at, but bitter to the taste.

WILLIAMS—I notice the report is adverse to red raspberries; which varieties? The Thwack with me is hardy.

BARNARD—I have grown Turner seventeen years on the same land and it never winter killed. The Cuthbert and Reliance are no good with me. They are not so strong and not so hardy as the Turner. I want to ask has any one here fruited the Russian apricot? I think it has about received its quietus, as I can hear of no one who has fruited it.

HADKINSON—In Cass county I have eaten the fruit, and I consider it very fine indeed.

JENKINS—The Russian apricot is grown in Valley county; but red raspberries do no good there at all.

STEPHENS—I never enthuse on the apricot subject; pears are my hobby. The results with apricots are not the most gratifying, yet I believe they will be a success if we only know how to prevent “jack frost” from nipping the early bloom.

LETTERS FROM PROMINENT HORTICULTURISTS.

KEARNEY, NEBR., January 9, 1890.

G. J. Carpenter, Fairbury, Nebr.: DEAR SIR—I have thought for some time back that I would be able to attend the meeting of the Horticultural Society this month but find I cannot take the time, and thinking I might be able to contribute some items that may be of value I will write.

It has been my privilege to visit many bearing apple orchards in this county (Buffalo) during the past season. I noticed that some kinds that I would not have recommended for trial were very fruitful, such as Jonathan, Winesap, Janet, Dominie, etc., and that the trees were in very good condition considering the sudden freeze in November, 1887. At that time the leaves on the trees were yet quite green. The fall had been quite warm, with considerable rain, so that trees had made a late growth, and up to the day of the "blizzard" (November 16, I think it was) we had no frost to speak of so that trees of all kinds were in very poor shape to stand 32° below zero. The freeze would not have done so much damage had it not been for the unusual heat in February following, at which time the thermometer registered 80° above zero in the shade. This intense heat after the hard usage in November literally cooked the southern side of many kinds of trees, so that on that side many are nearly or quite dead.

I notice that the Tetofsky, Duchess, Wealthy, Walbridge, Limber Twig, Haas, Pound Pippin, Ben Davis, Iowa Blush, Clark's Orange, and some others I do not know, are in better condition than any other varieties that have come under my observation. Red June and Red Astrachan do not come up to the mark for soundness when compared with the kinds above named, and yet on the upland twelve miles north of Kearney I saw two Red Astrachans that appeared to be perfectly sound and were very fruitful, but those in the valley lands that I have seen of this kind are in bad shape.

I am sure that trees on the upland stand the sudden changes of our climate better than do those in the valley. Another thing, those who have cultivated their orchards without cropping the ground have the soundest and most fruitful trees and no mice to burrow and eat the roots. Our people should be very careful about making harbors for field mice. They are getting here, and now is the time to take measures to prevent their increase and extension over the state. This is one reason why I do not advocate mulching; another one is, that there is no mulch so good as *fine loose earth*.

The crabs that do best here are Blushing Maid, Soulard, Hyslop, Hewes' Va. and Whitney No. 20, also Minnesota; I saw some others in fruit, their names I do not know. The Blushing Maid heads the list for home use. Mr. Geo. Smith, on Wood river, has eight or ten trees of this kind in his orchard that were, as he says, delivered him for Maiden Blush apple, which bore a heavy crop and he sold the surplus to grocers in Kearney at \$2 per bushel. Mr. Smith has given his orchard good cultivation the last two years without cropping the ground and was rewarded this season by a good supply of very fine fruit. His trees are protected on the north, east, and west by belts of Box Elder, which he has planted and allowed to grow without pruning or thinning out. On the south is the public road with a row of large Cottonwood on each side of it. His apple trees were very much broken on the north side, two years ago, by drifting snow which would not have happened had his belt of forest trees been four, or better, six rods wide instead of two.

Cherries do well here. Those of fruiting age that have given good crops are English Morello, Early and Late Richmond.

Plums—Weaver, Miner, and Wild Goose. Have seen but one apricot fruiting, which I took to be Large Early, but am satisfied they will succeed, as there are many young trees that are growing magnificently and do not appear to be injured by winter.

Pears—Standards only will succeed and not many kinds of those. Dwarfs might do in the hands of a skillful grower. The Flemish Beauty gives great promise; I know of a bearing tree of this kind twenty or twenty-five feet in height and six to eight inch trunk that looks to be and I believe is perfectly sound, that has borne last season and this full crops. The owner says of this tree that it has never been affected by blight in the least, not even when it was making such

rank growth before bearing. It looks as if the Keiffer (Standard) was going to stay with us. The LeConte is too tender for any use here. Who has tried the Birket in Nebraska? It works fine on apple stocks and I believe would be good here.

The best raspberries for here are Tyler, Souhegan, and Ohio. These kinds have given a good crop at Kearney every season during the last four years and are the only kinds I could recommend. There may be others just as good but I don't know it. The Gregg, which is the leader at Bloomington and Normal, Ill., is of no value here. Of the reds the Shaffer and Cuthbert have fruited some, though not enough to pay for bothering with them. The Turner does no good.

Gooseberries—Houghton and Downing have done best.

Currants—Red Dutch and White Grape. Would not be afraid to plant largely of the Fay. Think it would fruit as well as the others, with the chances that it would do better.

Strawberries—Crescent, Manchester, Mt. Vernon, Wilson, Sharpless, and Cap. Jack have all done quite well.

Snyder blackberry has fruited but once during the four years.

Grapes—Concord, Elvira, Lady, and Agawam have all fruited nicely when half way cared for. There are others, Perkins, Pocklington, etc., that will do as well.

I see my notes are getting long. Fellows like we are that love trees and fruits and flowers and love to plant and grow and care for them are, when they get started on their favorite theme, like a good clock, never stop until they run down. This must be my excuse for continuing. We see so many things neglected that if attended to would help us to make trees, fruits, shrubs, and flowers a success in our beautiful state. There are many difficulties to overcome, many things to learn that will be helpful, but the lack of practical knowledge, the carelessness and the slipshod methods advocated and practiced are the greatest drawbacks to success in tree and fruit growing with which we have to contend. Nine-tenths (I believe I am safe in saying this) of the people who buy trees do not really know what well-prepared soil is nor what is necessary to do to make a good plant. Our farmer friends laugh at us for using a 12-inch stirring plow (9-inch would be better) with a heavy team of horses to draw it; say it is too "slow and poky," "fooling time away," etc., but we *pulverize the soil* just the same and handle the same amount of dirt, the differ-

ence being that our furrows are *broadest up and down* while theirs are broadest *horizontally*. Another difference is we don't have to kick because our ground gets too dry for our stuff to grow if we happen to be without rain for a month or two. Our soil is fine on the surface and does not dry out. Well prepared soil and intelligent cultivation beats good luck and the cut and cover process, even with weekly showers, "all to death" for making *anything* grow in this country. Many buy their "model orchards," "glove-pruned budded trees," and go through the *motions* of planting and then mulch them with all the calves, cows, horses, and other creeping things on the place; to help matters, the lady of the house, who believes in trees and fruits and flowers and that they ought to be protected in a different manner, turns loose the dogs. The result is that in a short time there is nothing left of the "model orchard" but a few bruised, broken, stunted specimens, distasteful to the eye and a disgrace to the landscape; also a recruit to the army of fellows who cuss the nurseryman and declare trees a failure in Nebraska.

But I must stop before I run down.

The work of the Horticultural Society is a grand one, and nothing should be left undone to make it beneficial to the greatest number of the people of our state.

If this will be of any use in helping the work on, use it; if not, the waste basket will hold it.

Hoping the Society will have a successful meeting, and that much good will be done, I am, very truly,

J. L. BROWN.

DISCUSSION.

DUNLAP—The Birkett is no good.

WILLIAMS—How should we cultivate? I have tried nearly every method of handling an orchard and I don't see that I succeed very well with any of them. First I tried "hogging," but later decided that timothy was better; then I tried blue grass, but I find it "n. g."

NEFF—I find that corn is the best thing to raise in an orchard. I would keep the orchard in corn every year until it begins to bear, and even then I would keep right on.

CARPENTER—Do you use manure?

NEFF—Yes; I throw a little around.

MASTERS—I am surprised to see Williams rolling down hill so

fast. The "hogging" system was not so bad, but he got to the foot of the hill when he adopted blue grass. Corn is the best crop to put in an orchard. I have corn in my oldest orchard, and I raise a crop there every year. I had one of my orchards in grass for eight years, and found that the trees began to look sick, so I plowed it under. While the orchard was in grass the fruit was scattering and not nearly so large as it is when I cultivate a crop of corn between the rows of trees. I scrape up and burn all the leaves I can find in the orchard, as this, to a certain extent, prevents scab. If I was to seed down an orchard I would use timothy and clover, but never blue grass. The only objection to corn is its inconvenience.

WILLIAMS—It seems to me that corn would not pay the cost of cultivation. I would cultivate, but put in no crop.

MASTERS—Mr. Williams' trees are too close together. They should be at least forty feet apart each way.

BARNARD—Masters is a thief. He steals from his apple trees with corn. Instead of this he should feed his ground. Clover is the only grass for an orchard. When you cut the first crop you carry out all the insects that may be lodged in the grass. Cut the second crop and let it lie on the ground, and it acts as a mulch during the winter. Cultivate every four years and do not crop the ground. We take heavy crops of apples from our orchards every year, and this should be sufficient without burdening the soil with the addition of a corn crop. Manure should never be applied close to the body of the tree. Keep away at least four or five feet.

MASTERS—I would like to reply to Mr. Barnard that I manure my orchard with stable manure that costs me fifty cents per load.

SHELTON, NEBR., July 24, 1890.

G. J. Carpenter, Fairbury, Nebr.: DEAR SIR—As it will be impossible for me to be at the meeting at Crete this summer, on account of sickness in my family, I thought it might be of some interest to the members to know how we are prospering raising fruit in Buffalo county.

This is an off year with us. First—The peach, apricot, and Wild Goose plum buds were all winter-killed.

Second—There was a bug about the size of a small house fly that stung the buds on all the crabs and early apples so that the buds

dropped off. The trees had the appearance of having been frosted. When I first noticed them there was a drop of oil hanging on each bud. They went from the crabs to the standard apples. Would like to know if anyone at the meeting has had any experience with these pests and if any remedy has been found? I have heard of them in several other orchards around here and also of others they have not touched.

Third—We had late spring frosts that killed most of the blossoms on the apple that had escaped the bugs; cherries had the same fate; so apples and cherries in this part are scarce. The frosts killed a great many buds on the grape vines and then came on the rose-bugs, which would have taken all the grapes had we not fought them off. Would like to know a good remedy for these pests. If we do get any grapes we'll have to fight for them and then get only half a crop.

My strawberry bed was the only one near here that had any berries this year. I picked 800 quarts off six rows fifty rods long, and sold them for $12\frac{1}{2}$ cents per quart. The dry weather dried the raspberries and blackberries on the bushes. On July 13 the thermometer went up to 108° in the shade, 135° in the sun. Some of the grapes wilted on the vine. The wild plums are nearly all dried up on the trees, or are so small they will be worthless. With the exception of a few apple orchards that the bugs did not find and that were well protected on the northwest, and that are full of fruit, Buffalo county this year is fruitless.

If this is any value to you use it; if not, throw it in the waste basket.

Hoping that the meeting may be a success and that you may all have a good time, and trusting I shall be with you at the winter meeting, I remain, yours respectfully,

JOHN A. HOGG.

AMERICAN POMOLOGICAL SOCIETY, }
SOUTH HAVEN, MICH., July 11, 1890. }

G. J. Carpenter, Fairbury, Nebr.: MY DEAR SIR—It would be a great pleasure to me to meet with your Society on the 31st inst. and to make the acquaintance of the horticulturists of your state, as well as to see something of the products of your section of the "Great American Desert" of my school-boy days, but I regret to say that duties at home imperatively forbid. Yours truly,

T. T. LYON.

DEPARTMENT OF THE INTERIOR,
CENSUS OFFICE, WASHINGTON, Feb. 25, 1890. }

SIR: The receipt at the library of this office of a copy of the Report of the Nebraska State Horticultural Society for the year 1889 is acknowledged with recognition of your courtesy.

Very respectfully, ROBERT P. PORTER,
Superintendent of Census.

Hon. G. J. Carpenter, Secretary State Horticultural Society, Fairbury, Nebr.

DEPARTMENT OF AGRICULTURE,
CENTRAL EXPERIMENT FARM,
OTTAWA, CANADA, January 13, 1890. }

G. J. Carpenter, Esq., Fairbury, Nebr.: DEAR SIR—I regret very much that I will be unable to attend your meeting at Lincoln. A call east two weeks ago has prevented me from preparing a paper on the subject assigned me. Very truly yours, JNO. CRAIG.

DEPARTMENT OF THE INTERIOR,
CENSUS OFFICE,
SOUTH GLASTONBURY, CONN., July 12, 1890. }

MY DEAR MR. CARPENTER: Sickness of Mrs. Hale has kept me home a week longer than I had expected, and now I cannot make my western and southern trip both in one, so must go south now and take in the west in September, greatly to my regret, as I did want to attend your horticultural meeting. Yours, J. H. HALE.

NEWPORT, R. I., July 28, 1890.

MY DEAR PRESIDENT TAYLOR: Here, where I am enjoying an all too brief respite from the somewhat severe strain under which you found me laboring on your recent visit to Washington, and which has continued down to the present time, my thoughts turn to the Nebraska State Horticultural Society and its forthcoming meeting at the beautiful little city of Crete, always pleasantly associated in my mind with our excellent friend and esteemed fellow member, Mr. Stephens, and with the Boswell Observatory, where Prof. Swezey is doing so admirable a work for the state, at the head of its weather service. If your meeting were but thirty days later, I should probably be in a position to make public some of the results of the census, but when I left

Washington five days ago, Pennsylvania was the only state the whole of whose schedules had been received back at the census office, and I need not tell you how formidable an undertaking is the tabulation of the agricultural schedules of even a single state. I trust my Nebraska friends recognize in the agricultural schedule of the eleventh census an honest effort to give agriculture its due prominence in the great national stock-taking. When my worthy colleague (Mr. Mortimer Whitehead) and myself entered upon the discharge of our duties, we found that the most comprehensive and elaborate measures had been concerted and already well nigh perfected—I will not say for magnifying the importance of the manufacturing interests of the country, but certainly for leaving neither jot nor tittle of those interests without adequate representation in the reports of the census. Inspired by a keen sense of the injustice under which agriculture has for so long been made to suffer, in that general belittling of its importance which alone has rendered possible those inequalities of legislation which are now proving so burdensome to the agricultural interests of the country, we started out with the determination that the eleventh census should be made to afford the most faithful reflex of the actual condition of the farming interests of the Union that has ever been sought to be obtained, and in this endeavor we were warmly supported by Superintendent Porter. How far we have succeeded time alone will show.

Horticulture falls within the jurisdiction of my colleague, but the allied subject of forestry, the importance of which is nowhere more fully appreciated than in Nebraska, I am responsible for, and I am now maturing my plans for a special investigation of that subject by the most competent experts that are available for the purpose. As you will already have discovered, the horticultural products of the country have had an amount of attention bestowed upon them more nearly commensurate with their importance than has ever been attempted before. Not only are the horticultural questions in the general farm schedule more numerous than those of any previous census, but the special agent for that section, Mr. J. H. Hale, who, I regret to say, will be unable to attend your meetings, has been instructed to make his investigation as thorough as unlimited time, a liberal appropriation, and his own wisely directed enthusiasm can make it.

One word more in conclusion. I have often borne public testi-

mony to the excellence of the work that is being done by the Nebraska State Horticultural Society, and I feel curious to see what the census will have to show as the result of that work. The federal census possesses facilities for conducting investigations that are entirely beyond the scope even of the U. S. Department of Agriculture, with the niggardly appropriation annually doled out to it, and the department has very properly taken advantage of those facilities for supplementing in certain important directions its own work. Of the half million or more people who inspected the magnificent exhibit of Nebraska products at the St. Louis fair last October, few would believe, and a large majority openly ridiculed the idea, that such apples as were there displayed had been, or could be, raised in Nebraska. You cannot reach them with your reports and they probably would not believe them if you could. They will not attach any great weight to the statements of any other of your state publications, but let the *Republic* and the *Globe-Democrat* and the *Post-Dispatch*, along with other leading journals of the country, quote from the census reports as to the remarkable diversity of Nebraska products and as to the final dissipation of the fallacy so long associated with the one-hundredth meridian, and popular misconception will at once begin to disappear, and the marvelous capabilities of the best agricultural state in the Union (all things considered) come to be recognized. I wish the Society, through you, Mr. President, a most successful meeting, successful in the promotion of good fellowship, in the interchange of practical knowledge, and in the elucidation of those various problems that are continually presenting themselves during the development of the material resources of such a state as Nebraska. With much respect, I am, my dear Mr. President,

Yours very truly,

JOHN HYDE.

ADDRESS.

PRESIDENT TAYLOR'S ADDRESS—WINTER MEETING.

Members of the Nebraska Horticultural Society, Ladies and Gentlemen: In presenting to you this review of the state of our Society and of horticultural interests in the state, I desire first to thank the members of the Society for their hearty co-operation with the officers in forwarding the interests of the Society. Whenever we have thought that the Society needed any changes made in its manner of doing business, we have only had to mention the fact, and the Society has acceded to our requests.

When the present officers took their positions it was found that while there was money in the treasury, yet the amount was each year growing less, so that unless a halt was called the surplus in the treasury would all be absorbed in about four years. It seemed to me that this was bad management, and that the finances should be so handled that we would always keep within each year's receipts, so that as we came to the establishing of experiment stations, and the expenditure of money for other purposes for the advancement of horticulture, we should have something to draw from.

With this end in view it was recommended to the Society that the salaries of the officers be cut down to keep the expenditures within the appropriation. The Secretary's office was of course the heaviest drain on the treasury, since the Secretary is the only salaried officer. It seemed best to adopt a scale of salaries which would be absolute, so that the claim that any officers were causing unnecessary expenditures or running their offices on too liberal a plan could not be made. For that reason, the following was adopted as the maximum pay of the officers and superintendents:

Secretary, \$500, from which he must pay his own assistants and expenses, except for stationery and postage.

President, \$3 per day for the time spent in the service of the Society.

Treasurer, no salary or allowance for transportation or *per diem*.

Superintendents, \$3 per day while in the service of the Society.

Regarding the salary question, I think that, since the Society has districted the state, and elected directors from each district, arrangements should be made to pay the traveling expenses of the directors to the annual winter meeting. This would place the directors under obligations to the Society to the extent that we would have the right to expect a full and complete report of the condition of horticulture in each district from the director. No one who has not attempted the gathering of the statistics has any idea of the meager reports that are secured by any of the plans now feasible. Someone should be responsible to the Society for the gathering of such information, and presenting it to the Society in such a form that it can be printed in the report, and thus be at hand for ready reference. No director should be continued in office who does not thus supply a full report.

Another matter, about which I think this Society should be making a start, is the establishing of experiment stations for the testing of new varieties of fruits and plants as they come out, as well as for making careful reports on older sorts. Eventually there should be about a dozen such stations, but at present probably four or five are as many as we should undertake. The Society should set aside—say \$100—for the purchase of promising stock, under the supervision of the Executive Committee. This should then be sent to the various stations, having regard to the varieties adapted to the conditions at the station. Only men who are believed to be permanently located should be elected as station directors, since, in many cases, the results would not be apparent for some years. I would recommend that the appointments be made by the Executive Committee, for the reason that it may take months to find the right man in some of the sections where horticulturists are few and far between.

The summer meetings of the Society, held during the past two years, have been very profitable, and I think should be continued. I am of the opinion that the annual meeting should be held at Lincoln only during the alternate winters, when the Legislature is in session; at other times being held at various cities throughout the state. I have not been able to settle, to my satisfaction, whether or not we

are compelled to meet at Lincoln under our present charter, but if we are not permitted to meet elsewhere at the annual meeting we should secure such legislation as will allow it.

I am glad to report that the Legislature has been liberal enough with us to increase our appropriation to \$2,000 per year, which is double what had previously been allowed. This is specially pleasant to me, since a strong attempt was made to cut off our appropriation entirely, and it would be natural for the Legislature to say that we should have no increase in appropriations until we could settle up our own quarrels. The internal trouble mentioned above has seemed to only produce good results, in that it has caused the members to become more united in their efforts to forward the interests of the Society. It seems as though something is radically wrong when persons who have held the most honorable positions in the Society secede and attempt to undermine our organization and establish a new one, for the only apparent reason that they are not kept in the elevated positions in the Society. I think that no one should be kept in office more than two or possibly three years, with the exception of the Secretary and Directors of experiment stations. All other offices should be so divided that the responsibility of attending them may not become a burden. In no other way can the new blood that is coming into the state be utilized so well. No society receiving money from the public treasury, and existing only for the public good, should be allowed to degenerate into a close corporation.

A matter which has caused some unfavorable comment has been the late date at which our annual report has been issued. There have been several reasons for this; the Society at its last annual meeting instructed the Secretary to hold the report back, to include the proceedings of the summer meeting; the Secretary informs me that his last copy was in the hands of the printer on August 25, yet it was more than three months before any copies were ready for delivery. I recommended that in the future the report be issued as soon as possible after the winter meeting, running the report of each summer meeting into the report with that of the following winter. The winter meeting, though it occurs the first of the year, is for the year that has closed, so that the arrangement I mention would be proper, as throwing the entire report for one year into one volume. Our report should be in the hands of the people by April 1, and I think this

could be accomplished if the printing and binding are done as promptly as they should be.

The erection of a building for the horticultural department at the state fair will be a necessity which should be provided for. Should the city securing the location of the fair for the next five years agree to furnish the necessary buildings, we should see that one for our exhibit is furnished. Should no other way appear, it seems to me that we ought to set apart money to erect some building that will be suitable. The Society once ordered that an annex be constructed to the building which we have used in the past, but the order was never carried out. It is important that we have a place where owners of fine flowers and plants can show them, without danger of losing a large proportion from lack of light and necessary accommodations.

Our rules and regulations regarding exhibits should be so amended as to state explicitly whether flowers and fruits from outside the state should be allowed to compete for awards. By reason of the lack of a clear statement on this point, the officers paid premiums on a large floral exhibit grown in Iowa, but made the premiums so given, "special," so that they did not interfere with those given to Nebraska florists. This seemed the only just way to settle the matter then, but it should be definitely decided what is the status of exhibitors from outside the state.

On the whole, I feel that the progress and success of our Society during the past year has been most gratifying. I trust that this may be but one of a long series of successful years in its history.

In closing I can do no less than thank again the individual members for their help, for without this aid the officers would be powerless to do any great measure of good work.

F. W. TAYLOR, *President.*

PAPERS AND DISCUSSIONS.

GROWING SMALL FRUIT FOR PROFIT.

BY E. F. STEPHENS.

The topic of "Small Fruit for Profit," assigned me, is one to which I wish I had given a great deal more attention in the last ten or twelve years than I really have. That is, I wish I had devoted a larger portion of my ground to small fruit growing than to tree fruit, because they come into bearing so much quicker, the fruit is always salable at good prices, varieties test themselves as to their adaptability to our ground in a shorter space of time, and the length of time that the plantation must be carried as a dead expense, before getting suitable returns, is very much shorter than in the growing of tree fruit. While I would not advise a single individual to plant hundreds of acres of small fruit with the idea of marketing his crop in the large cities, as is done by growers in Illinois and the eastern states, because I do not believe that our rainfall is sufficiently regular and equable to make this commercially profitable—the fruit sold in that way is usually sold at less than half the prices which we can obtain here in our local market—yet I think that with the high prices which we can obtain in all of our interior towns, it can be made quite profitable to grow small plantations of the various small fruits which succeed.

If we cultivate our home markets and the towns nearest us and most accessible, we can obtain much better prices than any of the larger growers who ship to the cities are able to get. Quite a large proportion of these selling prices of their products is lost in express charges, packages, commissions, and glutted markets, all of which we save by selling our products in small towns, and selling directly to the particular storekeepers who sell to their customers. In this way we have never sold grapes at a less average than five cents a pound, and two years averaged eight cents. Raspberries always averaged fifteen, strawberries never less than twelve and one-half, blackberries never less than twelve and one-half, and if cherries should be included among the small fruits, this we would regard as a very profitable

fruit to grow in almost any portion of Nebraska. Cherries have always brought us \$2 and often \$3 a bushel, marketing usually in flats, baskets, and boxes. We find that fruit that can be marketed perfectly fresh, early in the day, from the near-by plantation, will bring from two to five cents a quart than that which is shipped in from a distance. Grapes also, which are marketed perfectly fresh, early in the morning, arrive in much better condition than those which are shipped in and bring better prices. We notice in the handling of cherries, that those who get their cherries after they have been shipped a hundred miles, or after they have been picked five or six hours have no real conception of the flavor of fruit fresh from the tree. All these facts are in favor of the grower who lives near his market. Probably our cherry crop has been as satisfactory a crop for us to handle, and has given us as much profit a tree or acre, as anything we have handled. Single trees have yielded us \$6.80, selling the fruit at wholesale, and have proved a fairly remunerative crop, the fourth year after planting, and from that time forward whenever the season was favorable.

Grapes will be found on the whole, a safer and easier crop, probably, to establish, and to grow and market to advantage. We have found it advantageous to select a warm exposure, which, with us, happened to be southerly and southeasterly, sheltered from the west and slightly from the north. On grounds like these we find that the Concord ripens a week or ten days earlier than on different soils and exposures. On a soil and exposure of this character we are able to commence marketing our earliest varieties of grapes early in August, and our crop is all sold, usually, by the 1st of September. This includes the Concord. We regard Moore's Early, Cottage, Worden, and Concord, as with us, profitable. Moore's Early, Cottage, and Worden are all earlier than the Concord, and all of fairly good quality. I do not think we can successfully compete in this part of the state with the eastern states in the growing of the Concord for late market, and which are sold in car lots, late in the fall, at prices so low that we cannot conveniently compete with them. Or rather, we can make more money by growing grapes that come into market earlier and are out of the way before theirs compete with ours. In this way we are sure of the best prices.

Now in regard to marketing grapes. While the man who grows

grapes very largely, that is fifteen to fifty acres, is compelled to market his grapes in the large towns where he can be sure of selling all that he may offer at any one time, the small grower should search out the smaller towns and build up a line of customers in those towns who will take his fruit at better prices. In this way he saves at least one profit by getting nearer to the man who finally sells to the consumer. This has been our experience. In this way, I believe a fair amount of fruit can be sold at an average of from five to eight cents in all our smaller towns. We would not encourage the growing of late varieties for fall or early winter market, unless it was entered into extensively and cold-storage houses of the proper construction, carefully watched and handled, were built up in connection with the growing of the varieties for the later markets.

The growing of strawberries in a small way, say an acre or two acres, can be made very profitable near any of the thrifty towns of Nebraska, for the reason that fruit that comes into the market perfectly fresh and as soon as picked will always bring from two to five cents more a quart than fruit that comes in in the condition that much of the fruit that is shipped in comes. This in itself helps to make a wide difference in the profit. Then too, when fruit is grown in a small way, picking can be cheaply obtained. Plenty of pickers can be had at one and one-half cents per quart and sometimes at one cent per quart. Then too, in a near market, you can almost always save your crates, which is quite an item of expense. The strawberry crop also is established and grown very quickly. We have found it advantageous, on the whole, to plant in the spring, on ground that had been very deeply plowed and thoroughly enriched with fine, old manure. In the course of the season, after each little rain, we usually take pains to go along and help the runners to take root, growing them in matted rows, by pressing them into the ground a little, and taking pains to grow them in rather compact rows. In this way the cultivator has a full sweep, and you can cultivate the open middles, a very small amount of hoeing is necessary, and an acre of strawberry plants can be established with a very few dollars.

So much for the first cost. At the approach of winter, about the time the ground commences to freeze, usually in November, we cover with about two inches of old hay, preferring old hay to straw because it is free from weeds. We find that the covering of our plants

here is absolutely essential to prevent the weakening of the plants by our dry winter winds. Along in April we usually part this hay a little bit over the row, or thin it enough so that the plants can grow up through it and leave it until after the crop has been picked and hoed. In this way the plants are kept clean, and the plantation holds moisture better, there is no hoeing or weeding to be done and the expenses are very much reduced.

We use, in marketing, quart boxes, using a box that holds a full quart so that our customers may be satisfied with it, and which cost us about seventy-five cents per thousand. The freight on these is about fifty cents per thousand. The making of those quart boxes costs us \$1 per thousand by the job. The crates cost us about \$8 per hundred. We usually recover most of our crates, so the number needed is not large.

The varieties to cultivate depends very much on the market. For a near market, varieties like the Crescent, Charles Downing, Sharpless, and the Wilson have given us good satisfaction, and our fruit has always been disposed of in our own town, or in towns within a short distance. Where the growing of strawberries is entered into in a moderate way near each town it is always possible to sell a few plants, and in this help out a little on the expenses. A man does not have to be a nurseryman to sell a few plants of promising varieties to his neighbor. This will help those who engage in the business in a small way in or near the interior towns.

Now regarding the raspberry crop. We have about nine acres of these. Our policy is to plant them mostly in young orchards where the cultivation of the raspberry crop also helps to cultivate the young orchard and helps to bear the expense of bringing them up to maturity and bearing. We have planted such varieties as the Tyler, Hopkins, Mammoth Cluster, and Gregg, and all these have given fair satisfaction.

In planting out a plantation of raspberries we would urge that the plants be as fresh as possible, and be careful not to set them too deep, and get them from near home as possible that they may be in best possible condition when planted. Our early planting of raspberry tips, shipped a long distance, were not very successful because of two things: First, they did not always reach us in the best condition; and second, we oftentimes set them too deep, and the plants

were smothered. Our workmen were apt to transplant the plants at the depth indicated by the pieces of old canes which were left attached, rather than planting the proper depth of two inches above the little rootlets out of which the sprouts would come which make the cane. Inexperienced workmen should guard against this in planting out raspberry plantations. Thorough cultivation should be kept up and the plants should be tipped when two or three feet in height.

We have never taken any pains to protect our raspberry plantations in the winter. But from what I have seen in Colorado I am satisfied that it would pay to protect our raspberry plantations somewhat in the winter, either by scattering straw lightly over them or mulching the ground.

The Tyler gives us our earliest picking and the Gregg latest. We have never sold our raspberries for less than fifteen cents wholesale and sometimes twenty cents, and there has always been a brisk demand for all we could supply.

We have had a plantation of blackberries, for about five or six years, of about two acres in extent. We have not found this commercially profitable on the ground on which we are growing it, yet I have noticed that my neighbor, Mr. Fisk, having a piece of ground naturally moist, gets four times as much fruit as we do and of much better quality. This leads us to infer that those who would grow blackberries for more than their own use, that is, for commercial profit, should be careful to select a piece of ground which naturally holds moisture, and in this way they will get satisfactory returns. We find mulching to be a very great help in increasing the crop and in causing the plantation to stand the winter better. One or two rows which joined the currant plantation which we were mulching very heavily, and which thereby received the part of the benefit intended to apply to the currants, yielded much more freely and endured our climatic difficulties much better than the others. Hence it would be inferred that it would be judicious to mulch the blackberry patch freely, not only helping to hold moisture and keeping the soil cooler and to a certain extent increasing the fertility.

We have not found a field of currants, growing for market, profitable. In an open field the exposure and the warm south winds keep the currants dryer and they have not yielded as well as we would

expect. We however find that currants under shelter, that is, where they have the shelter of the garden fence, have done well. We have found as good crops of currants where they were properly sheltered from the sun and south winds as good as anything we have seen in Illinois or other eastern states.

It is advisable always, in the growing of any of these small fruits for profit, to study the conditions which insure success and try to meet them. This being done, we feel sure that it would well repay any man with a careful, painstaking turn of mind to engage in the growing of small fruits in a moderate way, near any town in Nebraska. He will find that the consumption of fruit steadily increases with the supply of fruit of satisfactory character, and that in a short time he is able to build up a very nice business. In addition to this, the returns come in so quickly that it will help to maintain his orchard on which he will probably place his main dependence in later years.

Since Nebraska is so large a state, with various climatic conditions and varying soils, we would regard it as quite important that each planter proposing to establish a plantation should ascertain by correspondence and by personally visiting the parties engaged therein nearest to him, what succeeds best in his locality, what varieties and what methods, and then the careful and painstaking following of those methods, with an eye open to any improvements which may suggest themselves from time to time of himself, or his acquaintances or the horticultural people in general, will lead toward a fair success. Competition in all lines of business at this time is so excessive that we do not know of any line of business that promises very large profits, but he who is content to do plenty of work for fair prices and moderate profits, can engage in the growing of small fruits with confidence.

DISCUSSION.

CARPENTER—In Stephens' paper he states that we cannot grow grapes as cheaply as eastern men; I think this is a mistake, for their land is dear and the cost of labor is about the same as here; on the contrary, I believe if we would adopt their methods of growing and marketing grapes we could successfully compete with grape growers in any part of the United States; at any rate it is a shame that we buy so many car loads of grapes from the east when they could be grown here just as well as not. In our town of Fairbury last fall

no less than three car loads of New York grapes were shipped in at one time and they were all sold in a short time.

HARTLEY—I have heard something of that. One of the great advantages those New York fellows have over us is they go about the business systematically. Youngers has visited some of the New York vineyards ; I would like to hear from him.

YOUNGERS—In New York the grape men work on the co-operative plan : one man oversees the cultivation, another to the gathering and preparing the fruit for market, while still another sells all the fruit and watches the markets very closely at all times so he can take advantage of every rise in price. In pruning they cut back to two buds, thus getting larger bunches ; one of their bunches will equal two or three of ours.

HARTLEY—Is their Concord later than ours?

CARPENTER—Yes, I think it is ; but we can have cold storage here and keep our grapes as late as we wish ; we can grow just as cheaply here as there. There is a great future before the grape. While in New York last spring I went into Dewey's grape juice establishment ; he uses 500 tons of grape juice each season to make "grape shake ;" this is supplanting milk shake in the east as a cool refreshing summer drink and it is destined to become the national beverage. We ought to prepare for it by having plenty of grape vines planted.

COLE—How do you prune, Mr. Carpenter?

CARPENTER—I cut back to two buds, like the New Yorkers do.

COLE—How about the Niagara ; is it a failure with us?

REED—The Niagara is growing very well with us.

YOUNGERS—I have seen some very good bunches of it this summer.

DAY—This idea of growing grapes without protection is futile ; my experience is that we should give all our vines winter covering, and it is useless to look for success without giving our vineyards proper care. The tenderest grapes will grow here if favored.

CARPENTER—In western New York they cover their grape vines in winter. We can grow forty varieties here that will not grow in western New York ; they are too tender there. I don't use straw or mulch but lay the vines down and plow a furrow on each side, throwing the earth over them.

YOUNGERS—I have seen several grape vines killed by covering

with earth ; they started in the spring before the covering was removed and in consequence were smothered.

STEPHENS—Hubbard uses slough hay ; he says the mice are the only things he has to contend with, and they are not bad generally ; the important question is when to uncover ; earth is a bad covering, because we forget to uncover soon enough.

DAY—Earth is good for quick covering but is hard to take off ; hay, *vice versa*.

CARPENTER—Take a plow to uncover with ; I can do more uncovering with a plow than ten men with forks.

YOUNGERS—I saw raspberries in Colorado that had been covered with earth. They were in fine condition, and had been covered with a spade.

REED—Hagan, of Guide Rock, says earth mulching is almost a failure in western Nebraska, but hay mulch is good.

BARNARD—Does not this plowing up to the vines destroy many surface roots ?

CARPENTER—No ; we cultivate deep and induce a root growth deeper down. The plowing does not interfere in the least.

COLE—I would like to hear about the Lucretia dewberry.

REED—In regard to the Lucretia : it is a magnificent berry, but is tender, and not profitable.

COLE—I have seen the Lucretia growing well where no winter protection had been used and it appeared healthy.

HARRISON—I think the Lucretia hardy.

HARTLEY—I would like to hear testimony in regard to the influence of shade in small fruit growing.

DAY—Mr. Craig grows blackberries under the shade of his apple trees.

HARTLEY—I saw, this summer, a small-fruit plantation where there was no shade—and no berries. Again, I saw another one, where the plants grew in the shade, without cultivation, and the largest berries grew near a dense row of cottonwood trees—the last place one would have expected them. I am satisfied that the shade accounts for the large fruit, for surely no nourishment was given by the cottonwoods.

HARRISON—This question of shade has something to do with rainfall. Where only four inches fall in ten months you cannot raise blackberries with or without shade.

THE CULTIVATION AND MARKETING OF GRAPES.

BY G. W. ALEXANDER, FRIEND, NEB.

Mr. President, Ladies, and Gentlemen: The subject allotted to me on this occasion is "The Cultivation and Marketing of Grapes." Of course grapes must be planted before they can be cultivated. It is also very important that they should be well planted, if they are expected to be profitable in future years. Grape vines, the first year after planting, should be cultivated very much like you would cultivate a crop of corn, using a two-horse corn-cultivator first, straddling the rows, afterwards passing between them, working your land four times during the season, and using a hoe near the vines. It pays a large per cent on the investment to keep the ground mellow and clean. When the ground is kept mellow a harrow is a good tool to kill small weeds with, using it between the periods of cultivation. Do not attempt to practice economy by planting some other crop among your grape vines. What you plant may do well, but your vines must suffer. Grapes, the second year after planting, will need the very best care and cultivation you can give them, for this is the year the canes grow that bear the first crop of fruit. During the growing season of this year great care should be taken to preserve from two to four canes for bearing fruit next year, by tying them up to stakes. After the vines have been tied up to stakes, one of the best tools to cultivate with is a one-horse plow with five shovels. You will also find a one-horse harrow a very useful tool. The grape vine does not need to be cultivated very deep, but often.

The past spring a gentleman was at my house who has had thirty-two years' experience in growing grapes in California. He says there is no doubt we Nebraska grape-growers can grow a good crop of grapes without any water after April if we will keep the cultivator going, provided the land has been put in good condition before the vines were planted.

The third, and after years, vines must be well cultivated—not less than four times, but six would be much better. It will also be neces-

sary to hoe them several times during the season. Like any other crop you may grow for profit, they require work and care. The successful grape-grower in Nebraska must give his vines the best of care, thorough cultivation, and protection during the winter. Believing as I do, there is nothing that pays a man so well for his time and labor as the grape.

This brings me to the other part of my subject—marketing grapes. My experience has taught me to always sell grapes in packages, and not by the pound. I have had no trouble in getting ten to fifteen cents per pound for grapes in packages, while by the pound I could only get five to eight cents. The ten-pound grape basket does very well to market grapes in, but we need a package that will hold about five pounds. I believe a home market is the best market we can have. As for my part I have never been able to supply my home market. Then the uncertainties of shipping fruit is quite discouraging to most people.

In picking grapes for the market never pick when they are wet. Always reject green or damaged berries. Put nothing on the market but what can be used by the consumer. Then you will soon establish a good reputation. In filling your packages turn the stems of your last layer of bunches down and fill packages level full. If necessary, use parts of bunches for filling in the small spaces, and be careful not to rub the bloom off. Make them look as attractive as possible. It seems to make very little difference in regard to the color of grapes, but size and earliness have something to do with the price. My earliest grapes always bring the best prices, and among the very best early grapes stands the Coe grape, the Jefferson, Duchess, and Goethe Rogers No. 1 coming in as first class late varieties. You will also find the pruning of the vines has a great deal to do with the time the fruit ripens. For instance, my Concord grapes are ripe and sold before my neighbor's grapes, of the same variety, are ripe.

DISCUSSION.

HARTLEY—I would ask for instruction in pruning.

ALEXANDER—I can't tell; that's too long a story.

DAY—I would like to know if summer pruning is being abandoned. I have never believed in it.

CARPENTER—I would like to hear Mr. Strand tell about summer pruning.

STRAND—There is but little to tell. We clipped this year back to two buds, which we left for next year's wood.

CREIGHTON—I have practiced pinching off the laterals and think it a good idea. In regard to the Niagara, I would say plant Niagara; it will outbear anything—an enormous bearer, good seller, and hardy vine; it is free from mildew, a beautiful vine of great vigor. It is tender when very young. I would plant largely of it.

GRAPES.

BY G. W. ALEXANDER.

Mr. President and Gentlemen: Your esteemed Secretary has requested me to read a paper before this Society on grapes. I hope it is not expected that I will read a scientific or learned disquisition. It would be impossible for me to do the subject justice, or even entertain this Society on the subject of grapes. If there is anything I can say to encourage others to plant the luscious grape, I am quite willing to do my best. I will give a description of a few I consider most excellent varieties of grapes, both for the table and market, that can be grown in Nebraska. In fact, this Nebraska soil is especially adapted for the growth of fine grapes, such as the

Agawam, Rogers' No. 15—A very fine table grape; good, fair sized bunch, with a large berry; a beautiful wine color when ripe; vine quite hardy, but not an iron clad; ripens a few days before the Concord.

Goethe, Rogers' No. 1—One of the finest of all the Rogers grapes for the table; bunch above medium; large berry; color white, usually, with a red tint on one side of berry; vine a good grower, not very hardy; ripens some ten days after the Concord.

Herbert, Rogers' No. 44—A superb grape for the table; a large heavy bunch, with the largest berry of any grape I am acquainted with; a delicious flavor; color black; ripens six to eight days before the Concord; a productive, strong growing vine, about as hardy as the Concord.

Barry, Rogers' No. 43—Very little difference between this grape and Herbert, Rogers' No. 44; a splendid grape; not as strong a grower as No. 44.

Wilder, Rogers' No. 4—A good grape, with fine, heavy clusters; large berry; color black; ripens about with the Concord; vine a strong grower, healthy and hardy. This grape I believe would give the best of satisfaction in the southeast district. I have fully tested the above named varieties with others of the Rogers grapes.

I would also recommend for the table or family use:

The Brighton—A most delightful grape if picked at the right time; with very large, heavy clusters; medium sized berry; color a lovely red; ripens a few days before the Concord; vine a good grower, not hardy.

The Jefferson—One of the best of grapes. In quality it stands at the head of the list of American grapes, with fine large clusters; good sized berry; color a beautiful red; productive, strong growing vine; ripens eight to ten days after the Concord; not hardy.

Duchess—This is one of the best of small grapes; with a compact, medium sized, golden colored cluster; will keep with very little care until Christmas. The sweetest of all American grapes; dry them for twenty days and they make a very good raisin. Ripens a week later than the Concord. It improves this grape to let them hang on the vine two weeks after they are ripe. Vine a strong grower, healthy and hardy. It should be extensively planted.

A FEW GOOD MARKET GRAPES.

The Coe Grape—The best early black grape in my collection of fifty varieties; not generally known, although fruiting for eighteen years in Washington county, Iowa; has never missed bearing a heavy crop of fine fruit; of all the early grapes this is the best. Prof. J. L. Budd and Hon. Silas Wilson, of Iowa, both speak well of this grape. An ironclad in hardiness; bunch and berry above medium; a productive strong growing vine; should be better known. This is the grape for the people; will succeed where the Concord fails; a valuable variety.

For an all purpose grape the Worden stands at the head of the list in Nebraska. A fine, large, heavy bunch, with a very large berry; color black; ripens eight to ten days before the Concord; is better in every respect than the Concord; vine a good grower and very hardy; should be generally planted.

Moore's Early—Another fine black market grape; bunch above

medium ; an extra large berry ; not very productive ; ripens eight to ten days before the Concord ; vine rather a slow grower, hardy and healthy.

Niagara—A very large, white, showy grape of fair quality, with immense bunches ; large berry ; a productive, strong growing vine ; ripens a few days before the Concord ; not hardy.

Perkins—The poorest in quality of any grape I have named, although I have had the best of success with it as a market grape, selling my entire crop of 1889 at ten cents per pound, of this variety. In 1888 I sold the product of one three-year-old vine for \$2.50. Bunch and berry medium ; color pinkish red ; a productive, strong growing vine, hardy as the Concord on my grounds.

There are many excellent varieties of grapes that I might speak of both for the table and market. But as this paper is already longer than I intended, I will conclude by saying, with experience, knowledge, and pluck, I feel confident that in the near future this wonderful rich and fertile south Platte country will be as celebrated for the production of fine grapes as any part of the United States, not excepting California.

DISCUSSION.

DUNLAP—Do you think the Coe as hardy as the Concord.

ALEXANDER—I do—hardier.

CARPENTER—I think the Brighton at head as a table grape. It is a pretty even race between Brighton and Delaware, but the Brighton is a little ahead. I always cover my vines in autumn for winter protection.

DAY—Do you cover your vines, Mr. Alexander?

ALEXANDER—Yes, I cover all but Elvira, Coe, and Janesville.

CARPENTER—We overlook wintering grapes ; we can keep Goethe, Pocklington, Duchess, and Wilder till mid-winter and after. In New York the grape growers make big profits by keeping Catawba, Isabella, and Delaware into the winter and selling after other grapes are off the market. The grape is neglected too much here and the fact is we can raise the best grapes here of any region in the United States ; nowhere is there so much sugar in the grape as here. In the east there is too much rain, likewise in California, while in the irrigated regions they are too watery.

PROPAGATING GRAPES FROM EYES AND BUDS.

BY J. H. HADKINSON.

Having had some previous experience east in propagating grapes from eyes, I concluded last spring I would try it on a more extensive scale here in Nebraska, as I could not make a success of cuttings satisfactory to myself. I built a small propagating house of glass and heated it with hot water, supplied by a steam boiler, into an open tank six inches deep, two feet wide, and running the entire length of the house, with partitions in it for to make a continuous flow of water from end to end and back into the boiler. From the middle of February to first of March I cut my eyes or buds, commencing on stem about one-half inch above the bud and cutting half way through stem and out about one-half inch below bud. I then callous in sand kept moderately damp. When calloused I take eyes and plant in seed pans or boxes three to four inches deep in a mixture of about two-thirds good sharp sand and remaining portion good porous soil, maintaining a temperature of from 70° to 75°. After vines start and attain a height of from two to three inches I remove to cold frame and put a succession of seed pans with eyes planted in over-tanks. At a suitable time after hardening and during a damp season I plant in open ground same as cabbage.

I do not claim for this method as robust a growth as from cuttings the first year, but the second year they will make a growth that will far exceed the cutting as I have seen from a few propagated by a friend of mine about four years ago. By this method I saved ninety per cent of eyes planted. I also utilized my space under shelving to callous cuttings, and from these I realized a stand of about eighty per cent of cuttings planted, planting same when weather was suitable.

CURRANTS AND GOOSEBERRIES.

PRESIDENT—Mr. Barnard, have you your paper prepared?

BARNARD—I don't know anything about currants and gooseberries, hence have no paper.

MEMBER—Can a clump of gooseberry bushes be divided so as to make four or five plants?

PRESIDENT—I think it could.

COLE—What exposure is best?

YOUNGERS—I think a partial shade is best for both currants and gooseberries.

BROWN—Don't forget the Fay's currant—the best in the world; very long fruit stem and an abundant bearer; it should be planted in partial shade, as also should the Downing gooseberry. I have been yelling Downing for years and have not changed my opinion yet.

CARPENTER—The Downing begins bearing very young and bears every year; it pays as well as any fruit we have.

REED—Do you cultivate the vines? We have, and where we cultivated they do not bear as well as those that were not cultivated.

DAY—The Downing is undoubtedly one of the best gooseberries grown; it bears a peck to the bush; but few know about the gooseberry. Mine have the shade of a wire fence on the west side. I leave six or eight stalks to the hill, which will make a larger clump of bushes as they grow older.

LAING—I have some gooseberries that were imported from England; they grow with only one stem. We had a hail storm this summer that knocked off most of the fruit, but from what few were left I think they will be a grand berry—as large as a crab apple. Don't know if they will mildew.

DEWEBER—I lost all my Industry this summer by mildew.

THE CRESCENT STRAWBERRY.

BY G. J. CARPENTER.

Is there a better strawberry for all purposes than the Crescent?

Our answer is—No.

Every year several new strawberries are sent out as candidates for public favor that are claimed to be more productive than the Crescent, but by some means they fail to reach the goal.

First there came the Manchester, good in a few favored localities, but subject to rust, and a complete failure in others. Then the James Vick entered the race, but was soon distanced by the old and sturdy favorite. The James Vick was found, however, to be a good running mate, as it furnished more pollen than any other sort, and is by far the best fertilizer for the Crescent. Big Bob was soon bobbed off the track; Atlantic, Parry, and Jewel were entered but failed before they reached the quarter stretch. Then came the Jessie with a flourish of trumpets and numerous backers, and won a few heats in the cool north, but failed in the heat and change of soil found in south and west. Then came the big and lubberly Bubach, a winner for a short time only, in a few favored localities, while in other places it was a decided failure.

Ten years ago the Crescent had the belt as the earliest and most productive strawberry in the field, and it holds the same position to-day—east, west, north, and south. It is the leading market berry, and I venture to say that there are more quarts of this variety than of all other varieties combined.

It is true, there are berries that are a little better flavored, and that are more solid and will stand shipping better, but at the same time they have each some defect that prevents their general culture.

Again there are varieties that do well on certain soils and favored localities, but even here we find the Crescent by their side.

The ideal berry that can take the belt from the Crescent must have its hardiness, its earliness, and its productiveness, together with the

firmness of the Wilson and the size of the Bubach. Until that variety is produced the Crescent will remain the best berry for all purposes.

SHOULD THERE BE A WIND-BREAK AROUND SMALL-FRUIT PLANTATIONS?

BY O. F. SMITH.

I take nature for a teacher, and the only answer I can give is, yes.

Wind-breaks should be put around small-fruit plantations, especially on the south and west; on the west to protect from the evening sun, and on the south to guard against hot winds in summer.

As most all small fruits should have winter covering a wind-break on the north is not necessary, in fact rather a detriment as it prevents a free circulation of air.

I find in the canons of Custer county that wild fruit rarely does well if exposed on the west or south, but invariably bears well if on a north or east exposure. This I take as a guide for planting wind-breaks, and it works admirably.

There is very little more to say on this question, so I will leave it to the Society.

DISCUSSION.

HARRISON—I endorse what Smith has said, but would add that wind-breaks should be planted on every side. Defend from the north wind and your plants will bear twice as much.

SMITH—But if only two sides are protected I should prefer the south and west.

STEPHENS—Until lately I thought we should have a north wind-break, but heavy protection on that side prevents a free circulation of air and proves detrimental when frost comes. A great question is how to protect from late spring frosts. We have tried seeding our orchard to clover and let it fall to the ground, thereby retaining the frost in the ground as long as possible and retarding the blossoming season until the danger is past. We have also tried "smudges," or piles of coarse manure, litter, chaff, straw and such things that will make a dense smoke. These we fire about three or four o'clock in

the morning when a frost seems imminent, and the smoke prevents much damage.

MILLER—I don't believe in wind-breaks ; I think they cause blight. My neighbor has heavy wind-breaks around his orchard and his trees blight very badly, while mine are free from blight and have no protection. I cover everything I can ; would cover my apple trees if I could, but I have no use for a wind-break. I think if we can protect from the late spring frosts, as Mr. Stephens has said, we are all right.

BELTZER—I know of an orchard right on top of a bluff that has no protection whatever, and it bears well every year. I would not give one cent for a wind-break. I can't see what good a wind-break is doing around an orchard anyhow.

SMITH—It protects the trees from the hot winds in summer.

CARPENTER—I think it a benefit to have a wind-break on the south and west, but none on the north.

COLE—I know of an orchard on a hill where it has no protection, and it is blighting very badly.

GAGE—I must take issue with Mr. Carpenter. We jump at conclusions too much ; it may be that wind-breaks don't cause the failure, there may be some other cause. I can't help thinking that a sweeping north wind is not good for any plant. Another thing, a wind-break on the north causes the snow to lie on the ground, and this is a good thing for plants. I think vines are protected by a north wind-break.

WINTER APPLES.

BY PETER YOUNGERS, JR.

There are many things that can and ought to come under the range of winter apples.

That would make a paper on this subject too long for a reading at this meeting. So we will confine our remarks to a few of the most important items.

As we take it for granted that this paper is intended to be of some use to the new planter, we therefore leave out many points familiar to the old fruit grower that would take up too much space in this paper, as the discussion will bring them out this afternoon.

To go into detail as to the commercial value of the winter apple, or to tell how they may be stored for long keeping, or to the method of gathering them, are left with other members of the society.

So we think the starting point is, "What shall we plant for?" If we plant for profit, we must plant such varieties that have proven reliable and abundant bearers in our locality.

If we plant simply what might be termed an experimental orchard of winter apples, then the list of varieties has no limit.

In planting for profit in this locality (Fillmore county) we would plant but very few varieties. After testing and fruiting nearly sixty varieties of winter apples, we find the following list of varieties the most profitable in order named: Ben Davis, Winesap, Jonathan, Grimes' Golden, Genet, and Iowa Blush.

We have all of the above list bearing for nearly twelve years and the results of each variety carefully noted, and our success, from a financial standpoint, is based on the varieties in order named. To illustrate: the Ben Davis, ten years after planting averaged ten bushels per tree; Winesap, ten; Jonathan, six; Grimes' Golden, six; Genet, four; Iowa Blush, four. The Ben Davis in twelve years from planting again averaged ten bushels; Winesaps averaged but eight bushels. Our next large plantation, some thirty-five acres, will be all Ben Davis; but were I to plant winter apples for family use I would add to the above list many varieties, such as, Otoe, Ortley, Smith Cider, Day, Missouri Pippin, Winter Wine, Rome Beauty, and White Winter Pearmain, while many more would pay for cultivation. This list would fill the table from early winter until the following season, as we have preserved the Ben Davis, Winesap, Genet, Rome Beauty, and White Winter Pearmain until July 25th.

After making the selection of varieties, the most important part of the work is yet to come, as in order to insure success with the varieties selected it will be necessary to properly prepare the ground to receive the trees, by first plowing as deep as possible and then finely fitting the ground; by planting carefully; and good cultivation. We cultivate at least four times and often six times during the season; this is necessary to insure success, as the first two years are the most critical period of the young orchard's existence. So in order to succeed in growing winter apples, select wisely; properly prepare the soil; plant carefully and cultivate thoroughly, and success is certain.

FALL APPLES.

BY R. N. DAY.

Mr. President, Gentlemen of the Nebraska State Horticultural Society: According to our programme as herein made and provided, you would very naturally look for something from me, as my name appears accidentally or intentionally on the programme, I cannot tell which. But in order that there may not be a break in the exercises to cause confusion and throw fellow members off their bills I will proceed to make a few remarks as they have occurred to my mind about the autumn apple.

Our autumn list as it stands to-day is a superior one in many respects. Let us examine a few of its specimens and see what their merits are :

The first in season is Day and Wealthy. The Day is perhaps the superior in quality, being a very mild, sub-acid, sprightly, tender in the highest degree, and very agreeable in flavor; in season from September 10th to the middle of October; size, medium to large; flat, slightly inclined to conical; color, when fully ripe, a greenish yellow. I have not in all my experience found a tree that had really as few objectionable or faulty characteristics as the Day. It is a strong upright grower and needs but very little pruning to keep the top or head sufficiently open while young, becoming by its abundant bearing quality open and spreading with age. The Wealthy is a beautiful apple of about the same season as the above, varying in size from medium to very large; quality, very good, being a sub-acid, fairly tender, juicy, sprightly and aromatic, and highly esteemed for its many desirable qualities. Color, yellow, with crimson cheek on the sunny side. Tree, upright and fairly good grower in nursery and orchard and a fine bearer and a very profitable variety for a convenient home market. Neither of the above are desirable for distant market as they are too tender and become more or less bruised in handling and soon commence to decay.

Next on the list I will place Plum's Cider and Utter's Red. Plum's Cider is a little later in its season than the above described, its season being through the month of October. In size, medium, or

a little above conical in shape. Color, yellow, beautifully striped with bright red. Quality, mild, sub-acid, very sprightly and agreeable flavor. Tree is a very strong, rather open grower, and needs but little pruning to keep it in proper shape, and is very highly esteemed wherever it is found in bearing. Utter's Red I think stands at the head of the fall list as a profitable fall apple. It is a very large apple, neither conical nor flat in form. It is not, as its name would indicate, a really red apple, but a very bright yellow, beautifully striped with bright red. Season, from the middle of October to December. Quality, very good; a very mild sub-acid, sprightly, juicy, and quite aromatic in flavor. Tree, an upright but not overly vigorous grower, and requires some pruning or thinning both in nursery and orchard.

There are many other autumn apples grown in Nebraska, of which I will mention the Fameuse or Snow, which stands very high in the estimation of many people and is really an excellent autumn apple; a little below medium in size, but very sprightly and delicious in quality, and a fairly good market apple for home or distant market. The tree is a slow grower and needs much care and attention to make it a sightly tree in orchard and is a little tardy in coming into bearing, but when once fairly at work is an abundant bearer. The Fall Winesap, an excellent apple, but with me a very faulty tree. Benoni in some parts of Nebraska seems to be a success, but has not proven so with me and I don't feel at liberty to recommend it.

I have samples of a sweet apple which I think promises to be very valuable. It is in good condition for use by the first to the middle of October and without extra care. The specimens are in good condition to-day and for quality as a sweet apple I think it the acme of perfection. The tree seems to be nearly perfect. I hope the members of this Society will carefully test the qualities of this apple and give it standing accordingly.

Maiden's Blush, an old standard variety of fall apple, possessing many good qualities, but in north Nebraska does not seem to be at home, and, therefore, has been superseded by more hardy sorts.

There are many others candidates for recognition, some for their size, some for the local origin, some because some man has determined to make a big stake out of his pet, and is pushing it for all or more than it contains or merits.

Now, in the economy of the household, these fall apples occupy a very important position. The early or summer apples, of which you will hear, have filled their mission and have passed off. Their existence has been too limited or too short, on account of their ripening in excessively warm weather, which causes all fruits in this season to soon decay, to be very extensively utilized for future use. But different now. The days are becoming cool and the nights cooler, and on this account our ripening fruits have better keeping or more lasting qualities, and the season has arrived when the apple predominates in the economy of the household, and autumn apples are occupying our attention in making cider for vinegar and other purposes, and for drying for later use. And I think the autumn apple is better adapted to canning or cider making or drying than either the summer or winter apples; therefore great importance should be attached to the apple of this season. Still I cannot advise extensive planting of fall apples, no more perhaps than the home demand and local market will require, as winter varieties are more easily managed for the market demand, and generally much more profitable.

SUMMER APPLES.

BY HIRAM CRAIG.

Mr. President, and Fellow Members of the State Horticultural Society: Being placed on the list for a paper to be read at the annual winter meeting and limited to only the summer apple, I hardly know where to begin and where to end, unless it be in the apple, but I presume the most of us would prefer to have the apple in the mouth, and enjoying its health-producing juices, especially if it be a good one. Now I was about to say—a truce to humorous frivolity and yet it is known to physiologists—that words spoken that are pleasing are an aid to digestion. Now what is better to aid digestion than eating the rich, well ripened summer apple in its season, at a time of the year when there is no other fresh fruits on the market, or grown in the state, unless it is the strawberry—a fruit liked and relished by most people. But the strawberry will cloy. But the rich

summer apple seldom satiates, when fresh and well ripened, its acids purifying the blood and regulating the system, made torpid by the long winter and bilious, clogging, spring months, they fill a long felt want. True, some varieties of the winter apples may be kept through the winter and during early spring, but they become stale and insipid, leaving several months when there is no fresh-ripened apples. I will mention a few of the many summer apples recommended by our Society that are first to ripen in our climate, mentioning each in the order of their ripening: Tetofsky, called the Russian Crab, quality only fair; Early Harvest, a good eating apple when just ripe, but soon becomes nearly and almost tasteless, for cooking it is better gathered just before ripening; Red Astrachan, a beautiful but acid apple, very juicy, and liked by many when fully ripened, fine for cooking purposes; Summer Queen, a fine flavored apple, good; Sops of Wine, a fine red apple, good for the table and for cooking; Red June, a handsome and highly flavored apple, very good; Cooper's Early White, a good apple for all purposes; Duchess of Oldenburg, one of the most profitable apples grown, of fair eating quality when well ripened, and there is none better for culinary purposes, its season for ripening lasting from four to six weeks, nearly all the apple season; High Top, or Sweet June, a rich, sweet apple, good for eating and baking. I could mention several more good summer apples, but will not at this time, as these are enough at present. But I cannot refrain from mentioning a few that are known in the catalogues under the head of autumn apples that ought to be placed in our list as summer apples, namely, Dyer, Lowell, Chenango, and Cole's Quince, and Hawley, all of very excellent quality. The summer apple, when in its best condition, is only adapted for home consumption and near market owing to poor keeping qualities, yet when picked several days before fully ripened, may, with care, be shipped several days before reaching their destination, and then be in fair condition for the market, but unripe and stale, a poor excuse for the ripe fruit just from the tree.

Oh, the summer apple, so sweet,
Just plucked from the tree,
With it none else can compete,
We'll try it and see.

KEEPING APPLES.

BY J. H. MASTERS.

Mr. Masters had no paper prepared, but spoke in substance as follows:

I have no paper, but can tell in a few words how to *keep* apples—don't eat them. I think a building could be constructed in such a manner that we could keep them a long time; say on the cold-storage plan.

One thing, apples should be gathered much earlier than most persons suppose. I remember bringing a lot of samples to the state fair and in packing up to go home, threw a lot of them promiscuously into a box, nailed it up and put it into the cellar at home, where it remained till mid-winter, when we happened to come across it in cleaning up. On opening this box we found the apples all good, summer, fall, and winter varieties, too, because they had been packed early.

I packed a barrel of Winesaps real early one fall and thought I would experiment with them; I headed up the barrel and told my folks we would leave this barrel till June. Opened it June 3d and found half a dozen rotten ones, about one-half peck of spotted ones, the remainder sound as a dollar and fully ripe. I took these apples to Omaha and gave them to several persons who were going to California; they took them there and exhibited them in that state. Early gathering is my view.

MARKETING APPLES.

BY SAMUEL BARNARD.

Mr. Barnard had no paper, but his remarks may be summed up as follows:

Like Masters, I have no paper. I am astonished to find so many fruit growers so careless about the shape in which their apples go to

market. It doesn't pay to be so careless—apples are like potatoes, if they look well they sell well. Of late I have resorted to very close selection in putting my apples in shape for market and I find it pays big. I have sold 1,000 bushels this winter at the top price. Always make it a point to have my apples go through two examinations, taking out the bad ones, windfalls, etc. There is no money in trying to sell windfalls with your good apples, as the inferior ones bring down the price of the good ones. It is a far better plan to sort out the scrubby ones and make vinegar of them, as you can then get nearly as much per bushel out of them as you can for first-class apples.

I have no use for commission merchants; they may be a necessary evil, but I doubt their usefulness. I go from one town to another and contract with some reliable merchant there to handle my apples, and sell direct to him. In this way I get a better price and the merchant has a better profit than if the same apples had to pass through a commission man's hands. Those commission merchants are always making excuses about delays, bursted packages, etc., and we have no recourse. One time I sent seven bushels of cherries to a commission house in Lincoln; heard from them shortly; said cherries were slow sale; but I happened to be in Lincoln a day or two after and saw my empty crates in front of the store. I investigated the matter and found those cherries sold readily at \$3.50 per bushel, while all I realized was \$1.50. Verily, of those cherries I got the smallest bite. There is plenty of home market if we only utilize it. Lots of people have no apples who could have bought last fall at thirty-five to forty cents a bushel, and now they are seventy-five cents.

I believe in close grading, as a bushel of inferior apples will make three gallons of prime vinegar, thus paying sixty cents per bushel, and this makes a market for windfalls, while the carefully selected apples will bring the top price.

PROPAGATION OF APPLE TREES.

BY G. J. CARPENTER.

There are three methods employed by nurserymen in propagating apple trees : budding, collar-grafting on whole roots with a short cion, and grafting on piece roots or a short section of a root with a long cion. I am very frequently asked the question, "Which makes the best tree," and I invariably answer, the latter system ; then, to the question, "Why," my reply is that where a short root and long cion is used, we get a tree on its own roots, and that if a tree is hardy above ground, it will certainly be hardy below. All that a short piece of root does for the long cion is to furnish water or sap enough to keep the cion alive until it can throw out roots for its own support. The short piece of root, being down where the ground is cool, is never developed to any extent ; in fact, you will find them on three-year-old trees but little larger than they were when first planted.

Again, trees propagated this way grow more slowly the first season than those produced by the two other methods, and they ripen their wood better in the fall, and are less liable to black-heart, which is caused by the severe freezing of unmatured wood.

The next question asked is, "What are your objections to the whole root and short cion method ?" and I answer that if you plant apple seed, no matter how carefully you may have selected it, and allow the plants grown therefrom to remain in the ground over winter, you will find in the spring seventy-five per cent of them dead from the effects of root-freezing, all this provided the mercury falls to or below zero during winter.

Now suppose a cion is put in at the collar or at the surface of the ground. In one of those tender roots the tree so grown will be root-frozen the first winter unless the nurseryman banks earth up over them or the snow happens to cover them during the coldest weather.

I have the same objection to budded trees, as the buds are put in above ground and the tender seedling root is liable to freeze the same as in the case of collar-grafts.

Again, during heavy wind storms the budded trees are apt to be broken off at the bud ; in fact, Nebraska nurserymen are obliged to tie budded trees to stakes or wire to prevent their breaking during the first season.

Although we propagate apple trees under all three of the systems mentioned, and have had years of experience in planting over 150 acres of orchard, we plant nothing but trees that have been raised from piece-root grafts, because we consider them the best.

We notice in some of our leading papers long articles on the effect of stock on the cion and telling how we should select our stocks as we select our cattle—by their blood. They seem to forget that there is no blood in trees, in fact, nothing but water, and that nearly pure.

All varieties are formed while the trees are in bloom by means of pollen. Some parties claim that grafting a winter apple in a root of summer variety will make the winter apple ripen too early in the season, or, in other words, affect its keeping qualities ; in this they are mistaken, unless it is a top graft and both varieties happen to bloom at the same time and the blossoms of the winter variety are pollenized by the earlier ripening sort.

To show that the root of a tree does not affect the cion, you can graft a thousand Ben Davis cions into a thousand seedlings with perhaps no two of them alike, plant the trees so produced on the same kind of soil and on the same slope where they are all exposed to sun and wind alike, and when those trees bear, the fruit will all mature at one time—a fact no practical orchardist will deny.

Some nurserymen set up the claim that the reason they charge forty cents for a budded tree or one grafted on a whole root and at the same time offer a piece root for fifteen cents, is because the former cost more than twice as much as the latter.

It takes one year longer to put a budded tree on the market than it does a grafted one, which would make it cost perhaps two cents more than a grafted one ; a whole-root tree costs one-fourth of a cent more than a piece-root tree—and as they cost a little more the question may be asked, “Why do nurserymen grow budded and whole-root trees?” Simply because the trees so treated grow faster in the nursery, and those who grow trees on the poor lands of the east and south are obliged to do so in order to compete with those who grow trees on the rich lands of the west.

In the east where there is plenty of snow to cover both bud and graft, and in the south where there is no severe cold weather, budded and whole-root-graft trees are all right, but in the west and northwest they are objectionable on the grounds mentioned.

DISCUSSION.

YOUNGERS—Move we take up Barnard's samples of wood and discuss the subject of root-grafting *versus* budding.

(Seconded, put to vote, and carried.)

BARNARD—I have samples in my grip—not la grippe, however—and these samples show conclusively the relative value of root-grafted and budded trees. I sent to Stephens for these samples of budded trees, and they are very good. I can't see much difference between the root-grafts and budded apple trees in point of growth or looks, externally, although when cut open, like I have these, the proof is in favor of root grafts. Many tree agents, in order to make a sale, tell customers that root-grafted trees are black-hearted. This is not so, and I can prove it by these samples. [Here Mr. Barnard explained his samples of tree roots and trunks, cut lengthwise to show the union in budding and grafting.] You will notice this budded tree shows a black place where the bud was inserted, and this is a good sample, many are worse than this. This piece-root-grafted tree, you will notice, shows scarcely a line to denote the junction between cion and root. This is almost a perfect tree. Root-grafts should be put together at once after cutting cion and root, else a slight dark line may result from too long exposure of the newly cut wood. Forty years ago root-grafts were put up with root about the same length as the cion; now we use one and one-half inch root and a long cion. If the cion is hardy the root will be hardy, as the tree will be on its own roots by the time it is two years old. Seedlings are conducive of watersprouts, but by running a long cion deep into the ground you produce roots on the cion itself and retard the development of the small piece-root. As Carpenter has said, not twenty-five per cent of apple seedlings are hardy enough to withstand our winters. Concerning the statement of those parties who advocate whole-root-grafts, that a piece-root having no tap-root will grow a tree with none, I would say it is all folly. Each variety has its own way of rooting, and the top influences the root, *not* the root the top. Take a seedling with a long

tap-root and put in a Jonathan cion. By the time that tree is five years old it will have no tap-root. On the other hand, a Janet will produce one whether the original root is whole or a piece. Remember that the cion has all influence over root growth, but the root has none over the cion or top.

HARRIS—This is an important question, and deserving of much attention. Our county has been overrun by agents selling Old Oak Process or whole-root trees. I got one of their circulars in which they quoted from J. L. Budd, giving his recommendation of whole-root trees. I wrote to Budd and in his reply he said he had never said whole-root trees are best, but he did think the crown grafts, or first piece of root, was a little better than those farther down.

DAY—I have studied this matter and think the root-graft far superior to any other; the junction between cion and root is underground and hence not exposed to the air like in the case of buds. Where the bud is put in as it is above ground and the stock cut off it gives a chance for decay right on the start.

CARPENTER—Top-working is good for the far north, the grafts being put in three or four feet above ground on hardy stocks, such as the Whitney, Tetofsky, etc. It is a hard matter, however, to tell without much experimenting what varieties are suited by certain stocks, as for instance the Tetofsky, naturally a slow grower, will overgrow in three years if grafted into Transcendent stock. You must select varieties suited to the stock or your orchard will be very irregular.

HARRIS—Our oldest orchards are seedlings top-worked and they are nearly all root killed. We cannot depend on seedling roots to withstand cold weather.

STEPHENS—We can see the merits of double-working where a tender variety is to be propagated; use a long, hardy cion and short root for the stock, then top-work when large enough to put in the graft two or three feet above ground.

MASTERS—I begun the nursery business in 1852 and was rather green at that time; begun propagating by using long roots and short cions and the result was that I lost ninety per cent of my planting. This set me to thinking and I finally resolved to try collar-grafts, or ones put above the collar, say four or five inches above ground; thought it would save time, too, but again I lost nearly seventy-five

per cent by root freezing. Since then I have been shortening the root and lengthening the cion until I use about a two inch root to a five or six inch cion, and I have no trouble if the variety is hardy. Tender varieties I top-work in the branches of hardy trees three years old. My reasons for grafting in the branches are that in the fork of a tree is the tenderest place, and many of the less hardy varieties crack open here after a hard freeze in the fall, and the next summer they sun-scald where those cracked places are. (BARNARD—"Name one that won't sun-scald.") Well, I don't know that I can in all cases. I believe I am the first man to advocate double-working. Have good trees double-worked. I regard root-grafted trees as much hardier and healthier as a rule than budded trees. I have thirty-three-year-old trees that are bearing good crops of apples and they are root-grafts. My worst cases of rotten-root are with trees grafted one foot above ground. The experience of thirty-five years may not be good, but try it.

A VISITOR—Twenty years is about the average life of an apple tree. Why is it? Is there any remedy? I am a native of Vermont and have seen apple trees 150 years old in that state, and many 100 years old that bear annually fifty bushels of apples. The apple originated on the shores of the Mediterranean sea and has been disseminated to all parts of the world almost. I think we will find the cause of our short-lived trees not in root-grafting, nor in budding, or top-working, but in the soil. In among the rocks in New Hampshire the apple tree flourishes, and why? Because the soil has all the elements necessary for the growth and development of a tree—loam, silica, and flint. Here and in Illinois the soil is a deep vegetable mold, containing little or no silex and the tree dies for want of it. I would suggest, as a partial remedy, placing a coarse gravel about the roots; this serves a double purpose—preventing the soil from becoming baked around the roots and feeding the tree what it needs.

CARPENTER—I think these old trees are but examples of survival of the fittest. I was through eastern Pennsylvania last year and saw many old trees. I asked an old gentleman about them and he said those living were the sole survivors of thousands. If we could prevent a thick sod perhaps our trees would live long, too. There is stone there to prevent much thick sod, and beside the rains fall slowly

there and soak into the soil. Here the rain falls thick and fast, and nine-tenths of it runs off before sinking to any great depth; result, the roots lack for water, perish, and die. Perhaps in 100 years apple trees now growing will still be living and bearing.

STEPHENS—Our trees grow too late in the fall and do not fully ripen their wood before cold weather sets in, and when the severe freezing comes on they are much injured thereby. Hardiness of a tree depends greatly on its condition when frosts begin; if fully ripened it will be hardy, otherwise it will not. Was much interested in Mr. Barnard's talk on marketing apples, and like his advice about avoiding commission men. We have sold 18,000 quarts of fruit in the past year at better prices than the Lincoln markets, which I must say are very irregular. We think the best method is to arrange as Mr. Barnard has said and ship direct and you and the merchant have the profits between you. We had no difficulty in getting \$2 to \$3.50 per bushel, wholesale, for our cherries. Regarding marketing apples, we believe in careful grading. In our grading last fall we said we will establish a brand and stick to it: No. 1 means no worm holes; No. 2 means some holes; No. 3, cider. We put up 4,000 bushels last fall; got \$2.25 per barrel. Grade carefully, keep clean packages, and you have a wide market. When eastern buyers found we had apples they came in and bought up all they could; then apples came to \$2.50 and \$3.50 per barrel. Ben Davis brought \$4.85 in Liverpool, and many of our Nebraska apples went there last fall. I am sure Nebraska won't lack for buyers if we are careful in our handling fruit.

MASTERS—Our soil has its defects; it lacks some things, but we can supply them; one is lime, the other potash. I have experimented with both with good success. Where I used lime the trees are healthy, large, and bear best. I think we should experiment with more than one element so we can discover what does best in our soil.

YOUNGERS—How do you apply?

MASTERS—I put it on the surface a little distance from the tree and dig it in with a hoe or spade. Lime is a decomposer; part of it is used by the tree as lime and part of it liberates certain gases which are also used by the tree. Concerning root decay being caused by some defect in the soil I think that is an error. I have examined a good many trees and found those affected by rotten-root are invari-

ably infected by the woolly aphis. This little plant louse multiplies so fast that millions of them will be found on the roots of a single tree; their work upon the roots causes small excrescences or knots to appear and eventually the tree dies of rotten-root only another name for tree blood poisoning. I use quick lime and slake it, either air slaked or water slaked, but I prefer water slaked; about one-half bushel to each tree; place it around the tree not nearer than ten or twelve inches and then dig it in, mixing it thoroughly with the soil. I do this every two or three years. I use a "nigger hoe" to dig in with and apply it early in the spring.

MORTON—Haven't trees been affected by this rotten-root along the river in places where the soil is of a limestone character? Isn't this disease prevalent?

MASTERS—I think not.

MORTON—Well, it is a fact that our apple orchards are short-lived; it may be caused by root-grafting, and it is either that or some defect in the soil. I know the fatality of apple trees is much greater now than it was prior to root-grafting. Nature gives each tree its own roots and never intended it to grow on another tree's roots, or to make part of its wood growth into root growth, as in the case of root-grafts, where the piece root acts as a temporary nurse. I have great respect for nurserymen but greater for nature. My apple trees came from Illinois, and were grown from root-grafts. They are all gone but the Haas; whether it made its tap-root or not I do not know, but I presume it did because it is living. I dug up some of these trees shortly after they died and found they were rotten at the junction between root and cion. I thought it was because they lacked the tap-roots; I may be wrong, but it has not yet been proven to the contrary and the question remains to be settled. It is not a lack of lime along the Weeping Water, nor a lack of potash, as there is more potash here than elsewhere. This is a grave question and I hope we will get at the bottom of it; we want to know why our trees are short-lived.

CARPENTER—One reason is that our trees bear too much. In the east there is a crop year and an "off year," alternating, thus allowing the tree to rest a year after bearing a heavy crop. Here we have no "off years," our trees bear heavily every summer and the result is short life. T. T. Lyon's theory of short-lived apple trees is that we have selected varieties that are heavy bearers, regardless of their

longevity, and the selection has been going on so long that our trees are all of the same class; heavy bearers, and short-lived.

PROF. HARTLEY—The short-lived feature is general. No doubt nature intended trees to grow on their own roots, but she never intended them to bear such heavy crops as our apple trees do.

BARNARD—Nature is my school teacher. I maintain that different varieties of apple have different kinds of roots. Seed does not reproduce; Peter M. Gideon found two out of 700 seedlings that were good enough to propagate. Each tree has a peculiar root of its own, and the *cion* dictates to the *root* every time.

BELTZER—This is a good subject, but we are in deep water; it is hard to solve and we can't agree. Our people want to know how to prevent sun-scald on the southwest side of apple trees. I am an advocate of root grafting; have no budded trees planted.

GRIFFIN—Concerning the aphids, I think that's what ails the trees. Mr. Reed can tell us about it; everybody is complaining of it. Mr. Masters noticed it, but I think nobody can help noticing it.

YOUNGERS—Mr. Masters made the point.

MORTON—Let us have Prof. Bruner called in to explain.

GRIFFIN—Let Reed tell.

REED—About all I can tell is that we have lost a large number of apple seedlings, and that the aphid is working on both roots and tops now in the orchard and nursery. The ground seems alive with them down our way.

(Prof. Bruner was here called in.)

PROF. BRUNER—The woolly aphid, or apple plant louse, works on both stems and roots. It assumes two forms, the woolly form affecting the roots of plants, the other the tops. It may be destroyed by dipping the infected parts, or applying to them soapsuds, lye, or kerosene emulsions. The aphid is very prolific, a single female producing in a single season about six millions of lice. They travel on foot, like many other insects, and with wings. Each form is capable of producing the other. The eggs are deposited on twigs or roots and cause galls and the moldy appearance on the roots of trees so affected. The mold is merely the woolly secretion the females exude when depositing their eggs. Wherever they are you can find the woolly lice by their moldy or woolly appearance. Kerosene is the best insecticide for the aphid, but it is hard to apply on the roots of trees

while they are standing in the ground. Don't think lime is as good as kerosene. Would rather use naphthaline as a museum pest protector. Don't think the direct action of the aphid will rot the roots of a tree, but the galls formed thereon will give a chance for their decay. The following is a method of making a first-class emulsion: one gallon kerosene, one pound of soap; churn with force pump and add ten gallons of water. Fresh milk can be used instead of soap if so desired. As a rule the aphid does not attack large trees, but prefers to work on smaller ones. Generally they work on the top in summer and on the roots in winter. Two or three applications of the emulsion mentioned will kill these pests. The tree cricket and the larvæ of the lace-winged fly feed on aphid. Plant lice increase at all times whenever opportunity offers.

STEPHENS—It is the business of the commercial orchardist to guard against late spring frosts. We do this in our orchards by having "smudges" of straw, litter, coarse manure, and anything that will burn piled up in different parts of our orchard, ready when the opportune moment comes to be sprinkled with kerosene and set on fire. We usually have our men—or one or two of them—stay up all night when there is danger of frost, and about four o'clock in the morning they fire these "smudges," if necessary, which causes a dense cloud of smoke to fill the orchard and prevents the morning sun from injuring fruit that may have been frosted. I have noticed trees leaning to the southwest do not sun-scald. We wrap our trees three or four years, and if this is attended to no trouble arises from sun-scald. We also plant fourteen feet apart north and south for the same purpose. We have noticed that late spring frosts do more damage than sun-scald. In 1878 our first bloom appeared April 18th, now they do not come until in May. We retard the blooming by close planting and by seeding the orchard to clover, letting the second crop fall and lie on the ground. Set the trees leaning toward the southwest and head them low, eighteen inches to two feet.

MASTERS—I should call four feet very low.

STEPHENS—We had trees headed about four feet and lost all of them from sun-scald. Then we purchased 1,100 trees of Mr. Barnard; these were low headed, and we have them nearly all now. Mr. Williams' orchard, planted twelve feet apart, yielded at the rate of 1,700 bushels per acre.

BARNARD—Sun-scald is the worst enemy we have to contend with it ruins the tree. It always comes worst in summers following severe winters and is worst the first year. Have resorted to leaning trees, but this is against nature's plans, and I don't like to disagree with nature. I use four cornstalks to each tree, and bind them on not too tight; these will last four years, and are a protection against rabbits as well as sun-scald. I use willow for tying, as it does not rot like twine. The trouble with leaning trees is that our hard winds do them mischief by twisting them and making a hole in the ground down along the stem, thus allowing the sun to dry out the roots. After rains look at your orchards and firm the soil around any trees that are loosened.

A MEMBER—How would screen wire do for protection?

BARNARD—It is not good against the sun, but would prevent damage by rabbits.

CARPENTER—I like basswood protectors best.

BELTZER—I would like to know which cause the most trouble, root or top?

MARSHALL—I believe sun-scald has killed more apple trees in Washington and Burt counties than all other diseases combined.

BELTZER—I move we resolve that the top causes more trouble than the root.

YOUNGERS—I second the motion.

DAY—I think trees want care just as well as live stock. Supreme negligence is the chief trouble. Overkindness or neglect will kill a tree; cultivate till after July and after that let it rip. (Laughter.)

PRESIDENT—You have all heard the question. As many as are in favor or think the tops bother most will raise the right hand. As many as are opposed or think roots are worst, do likewise.

Result: affirmative, 17; negative, 1. The question prevails.

LAING—I move we adjourn to 7:30 P. M.

Carried.

REMARKS OF HON. J. STERLING MORTON AND HON.
R. W. FURNAS.

PRESIDENT—I notice the Hon. J. Sterling Morton and ex-Governor Furnas are in the room; the Society would be pleased to hear from them on any subject they may wish to take up.

MR. MORTON—As Mr. Furnas and myself were walking up here from the hotel we were talking about apple trees and how short-lived the orchards of to-day are when compared with those of thirty and forty years ago; and I think this would be as good a subject as any for me to speak a few minutes upon. I am very much opposed to the present mode of growing apple trees from root-grafts made from pieces of seedling roots and I will give you my reasons for the same: In 1858 I planted quite a large orchard of apple trees grown in the manner I have just mentioned, and to-day there are but very few of those trees living; nearly all have died of rotten-root. After a great many of them had died I got to thinking "what causes my apple trees to die so fast?" So we went to work and dug up several of the dead ones to see what was the matter. In nearly every instance we found that a large shoulder had overgrown the root, and decay had begun underneath this shoulder; there was no tap-root to any that we dug up, and I feel satisfied that this was caused by the use of piece roots in making the grafts from which these trees were grown. I had noticed that the death rate was much larger after a long drouth, and after discovering that the trees had no tap-roots became convinced that this was the cause of so many dying. When we call to mind the old orchards in Pennsylvania, Ohio, and many other eastern states, and remember that they were grown from the seed, had never been touched with a knife on the roots, and consequently had their original tap-roots, it seems to me the early death of our orchards is explained, partially, at least. I am convinced that if we would go to the expense of getting top-grafted trees on whole roots that our orchards would be much longer lived. In Colorado I saw an orchard of root-grafted trees growing near one of top-grafted trees, and by the time the top-grafted trees got to bearing the root-grafts were nearly all dead. This is an important question for us to look up, and I think we should

investigate it thoroughly. My advice is "set trees with unmutilated roots."

MR. FURNAS—My experience has been the same as Morton's and as I do not like to steal another man's thunder I have very little to say on the subject. I believe top-grafting is best and will give better results than any other method.

CARPENTER—I would ask what we are to do for stocks? It is a fact undisputed, that fully seventy-five per cent of our apple seedlings are too tender to withstand our severe winters; and it would be an almost endless job to propagate very many trees by top-grafting.

MORTON—The best orchards in Ohio are seedling trees set in orchard rows and then top-worked; of course this is not practical for nurserymen, but it is for the orchardist only.

PRESIDENT—The long cion and short root is practically a cutting and in a short time the tree is on its own roots, which nine times out of ten is better than a seedling root, for a tree known to be hardy in top ought surely to produce roots hardier than a seedling which would freeze to the ground the first winter. We have set apart this afternoon for the discussion of the apple tree and its fruit in all the various branches and we would be glad to have Mr. Morton and Mr. Furnas come up and take part in the discussion.

CONCERNING WINTER APPLES.

SHELBY, NEB., November 12, 1889.

G. J. Carpenter, Fairbury, Neb.: DEAR SIR—I am about to replant as well as enlarge my orchard ground in coming spring and spring following. I am almost at a loss to know exactly what I want for late keepers and high-priced apples for home and foreign markets, as our high-toned apples are alreday at the top for distant shippers, etc. I have quite a big lot of Bens, Winesaps, Jonathans, and Wilows. My Jonathans pan out splendidly, and really, if they were a good shipper, I would plant out more. Tell me how you recommend Northern Spy and Rawle's Janet, or what is better? Do you think Newton's Pippin will hold here yet? I tried a thousand of my own grafts in '78; they grew well, but freeze their tips every winter; set them out in '80 and lost all. This is the grand high-priced apple of

New York, and one ought to know whether they will hold or not—low heads (six inches) makes one-half difference.

Are you raising any Newtown Pippins in orchards over there, and how the result? How long does it take Northern Spy to come into full crop bearing? I have but one tree and it stands where an old nursery stood twelve years, and has had no apples yet. My Willow Twigs mostly went the life with blight the last two years. We have to skip those trees given to blight. I am raising a few thousand of trees for my own use, but it is evident I will want five hundred to a thousand of some other kind. I have feared that future possibilities will develop the fact that there will at times or seasons be too many Ben Davis apples to be profitable. My apple crop is 2,000 bushels.

Yours, J. R. KINNAN.

PEACHES.

BY J. M. RUSSELL, WYMORE, NEBRASKA.

My experience in peach growing in Gage county, Nebraska. In the spring of 1880 I planted 5,000 budded trees; in 1881, planted 3,000; in 1883, 6,000; and in 1884, 1,300; but since my trees have been old enough to bear we had a series of extreme cold winters, or at least some extremely cold days in each winter, until last winter. Yet in the summer of '87 I had about 140 bushels of peaches and last summer I had 1,600, of which about 300 bushels were seedlings. I probably have near 500 seedling trees, being sprouts from roots of budded trees that were killed by a hail storm the next year after planting.

Now, the question is, does all this pay in Nebraska? I will say I have not made as much money out of it as I expected, although it has paid out and a little more, but the information I have gained about varieties best adapted to my locality has more than paid me for all trouble.

I will now explain why it has not paid better. Instead of planting only four to six varieties of the following list, I planted the thirty-five varieties: Wilder, Alexander, Waterloo, Amsden June, Early Riv-

ers, Troth's Early Red, Early York, Crawford's Early, Hale's Early, Coolege's Favorite, Foster, Conkling, Musser, Stump the World, Mt. Rose, Mary's Choice, Lord Palmerston, Druid Hill, Smock, Bilyeu's Late, Salway, Heath Cling, Old Mixon Cling, Lemon Cling, Old Mixon Free, Ward's Late, Wager, Richmond, Jacque's Rare-ripe, Crawford's Late, Steadly, Gross Mignonne, Downing, Chinese Cling, Hill's Chili.

Now, if I had planted the 15,000 with Alexander, Early Rivers, Hill's Chili, Coolege's Favorite, and two varieties of seedlings we are now propagating, I feel sure we would have had from \$12,000 to \$15,000, this year, instead of nearly \$2,500, and the same varieties that bore best this year bore best two years ago.

I will plant a few of some of the other varieties in the list. I expect to plant from 4,000 to 5,000 the coming spring, but will plant mainly of the few varieties that have born best.

The Alexander is a hard peach to handle and get to market in good condition. One side will be soft while the other is hard and hardly ripe enough to be good, and yet I will plant some of them on account of its season. We began picking Alexander and Wilder July 5th, and had peaches from then to October 20th. Bilyeu's Late was picked and shipped then, and sold for \$1 per box in Lincoln.

I wish to correct a mistake made in a letter written to this society at Fremont last July. I spoke of the Mountain Rose as one of my best bearers, but the variety I had for Mountain Rose is Coolege's Favorite.

My first planting is entirely too close, ten by fifteen feet. I will now plant sixteen each way.

DISCUSSION.

CARPENTER—Notwithstanding the fact that many people say we cannot raise peaches it seems that the pioneer peach grower of this state (Russell) has grown them in paying quantities and will continue to plant on a large scale.

HOGG—We have peaches in Buffalo county where the plum fails. I have not lost a tree there. We plant the peach tree and let the land go back to sod. This seems to make them hardy.

PLUMS.

PRESIDENT—Mr. Brown, have you your paper prepared on the subject of plums?

BROWN—Mr. President, this has been a serious winter for us; I have had the "grippe" and couldn't prepare a paper on the subject you mention. However, as I have had some experience with plums I can talk a short time about them. I think for general cultivation our American varieties are superior to those from foreign countries, although there are two European plums that do very well with us: the Damson and Lombard.

Both these varieties are pretty sure bearers and are generally well loaded with their delicious fruit.

Amongst the American varieties I consider the Forest Garden the best "all 'round" plum we have; it is the best for self-fertilization, or, in other words, will produce better results if planted alone, than any other variety; most American plums do not bear well if planted singly or in plantations of one variety only. The Forest Garden is of good quality although not the best, but taking into consideration its heavy bearing qualities, it is one of the most profitable plums for general planting. I find the Forest Garden and Miner good to plant together, as they fertilize each other and both bear better crops than when planted by themselves.

I have tried the Wild Goose, Rolling-stone, Wolf, and Mariana, and think they are all very good plums. The Wild Goose and Mariana are nearly the same in size of fruit, but the Mariana is considerably later in season of ripening. I have also tried the Golden Beauty, a light yellow free-stone, a veritable "beauty" indeed. Its flesh is very firm, which makes it one of our most desirable sorts for canning.

PRESIDENT—Has any one fruited the *Prunus Simonii*?

SECRETARY—It has been fruited at Beatrice I believe. At Ogden, Utah, I saw the trees bending down under their load of fruit.

BROWN—The bloom of the Miner will fertilize and be fertilized by any American variety.

CARPENTER—I think not.

BROWN—Well, I have seen Forest Garden and Miner planted side by side and both were heavily loaded with fruit. Almost any variety of wild plum will fertilize the Miner.

CARPENTER—The Miner is not a true American plum and it will not fertilize a true American variety. Yes, the Forest Garden will fertilize the Wild Goose.

BROWN—Then you use Chicisa to fertilize Chicisa, and Americana for Americana?

CARPENTER—Yes, sir.

YOUNGERS—I think the bees have a great deal to do with the fertilization of plums; there is no doubt they carry pollen from one tree to another and thus aid nature in her work.

PLUMS FOR THE PLATTE VALLEY.

BY JOHN A. HOGG.

It is with somewhat embarrassment I attempt to write a paper on the subject assigned me, namely, "Plums for the Platte Valley."

I came to Buffalo county, Nebraska, ten years ago last May. All the fruit I found in the county then was the wild plum and grape, the orchards that had been planted were not old enough to bear fruit yet. So it was a treat to the poor homesteader to find wild plums so plentiful and so delicious. My family gathered eight bushels one afternoon, some of the plums being as nice as any tame plum I ever saw. We selected the pits of the choicest of them and planted them in a row for a hedge. Among the trees that grew from these pits I have found three varieties that are choice and I think equal to the tame plum for table use. One that is of a yellowish green color and as large as the Wild Goose; it is a free-stone when ripe, the meat is firm and it can be peeled and pitted for canning like the peach or apricot; does not mash in cooking any more than the peach and retains its flavor well. Ripens middle of September.

No. 2, I call the Diamond on account of the peculiar shape of the fruit, which grows fully as large as most of the tame varieties. Ripens last of September and when fully ripe gets bright red on one side.

No. 3 is an excellent plum for late ripening ; it is yellow in color, almost transparent before ripening but turns to a very dark red when fully ripe ; the skin looks as smooth and glossy as if it had been varnished ; equal to the Wild Goose for table use but hardly so large.

The second year I was in Nebraska I found along a branch of Prairie creek a blue plum that I thought was the finest plum I had ever seen. It was large as the Damson and of a delicious flavor. At that time I was not much interested in fruit growing as I had been told that we could not grow anything but wild plum and wild grape in this part of the state, and I neglected to mark the trees ; since that time the tent caterpillar has kept the trees clean of fruit in that part of the county.

I am fully satisfied that we have wild plums on the Platte valley that with the proper care and cultivation can be made equal to any of the tame plums. A friend of mine told me the other day he had a wild plum that he had taken a premium on at the fair at Kearney last fall.

The worms and black-knot have destroyed a great many of the plum bushes on the Platte. In the last five years I have them pretty nearly cleaned out of my orchard. I haven't seen a black-knot or bunch on my trees for the last two years and I had lots of them three and four years ago. The curculio did not bother the three varieties of plums I have described to you.

I have had very poor success with the tame plums in the winter ; the last year's growth would kill back. I have the Wild Goose, planted eight years ago ; we got a few plums from them last year for the first time ; also a few Weavers. I have several other varieties but they have not fruited yet. I planted six trees that I bought for Weaver and Miner and they were full of plums this year, not much larger than a Morello cherry ; had a small pit and were excellent for the table, but the tree always killed back before last winter.

I don't know of any one who is having any success with the tame plum near me. It looks as though we shall have to fall back on our wild plums if we get any.

DISCUSSION.

DAY—How do you kill black-knot?

HOGG—I cut off all the affected parts, and whenever I notice ap-

pearance of its starting again, I cut off that branch down to clean sound wood.

YOUNGERS—Have you tried the Miner and Forest Garden?

HOGG—Yes, I have tried the Miner, but not the Forest Garden. I find that the Wild Goose and Miner both winter kill with us.

CARPENTER—Yes; the Wild Goose will winter kill in the Platte valley.

DUNLAP—I find the Wild Goose of very poor quality, but have discovered that the curculio does not affect it where it grows near wild plums.

CARPENTER—I think there must be some mistake about Mr. Hogg's Weaver plums bearing fruit. They could not have been Weaver, as that plum is a fraud. I don't think any person in this state ever saw the fruit of a Weaver plum tree. Our favorite plum is the De Soto. It is larger than the Forest Garden and bears earlier. Of course, the Forest Garden is a good plum, but I like the De Soto better. The Pottawattamie is an acquisition. Our trees are young but they have born a little. In quality the fruit is fully as good as the Wild Goose. In our plum orchard we have planted two Wild Goose to one Miner, in alternate rows, in order to effect fertilization. The Wild Goose has borne but the Miner has not.

L. A. BELTZER—Friend Carpenter attacks the Weaver, and I can't see why, as it is a good tree. We have it, or at least what was sold to us for the Weaver. I sent some twigs to Mr. Carpenter to find out. He pronounced it Weaver. Then I got some trees from him called Weaver. They were loaded with fruit last season. Fruit large, red, rather long, a free-stone, not a tough skin. It ripens about the first of September, and I never saw a finer specimen. The Miner and Wild Goose both do well with us.

CARPENTER—There must be some mistake about those Weaver plums. Either Mr. Beltzer has forgotten which kind he planted or we have given him another variety in a mistake. I would like to ask Mr. Williams about the Hawkeye plum, and how it does in Iowa.

WILLIAMS—It seems to be a fairly productive plum, although not many persons have fruited it yet. I believe Mr. Terry has, however. I would like to ask if the plum is as profitable as corn at fifteen cents per bushel, where one has to ship twenty-five miles?

YOUNGERS—We find it far more so. Our Forest Garden trees av-

erage us \$5 per tree each year, at \$2.50 to \$3 per bushel. We can sell all we have right at home.

GALBRAITH—How does Mr. Youngers plant, to secure fertilization?

YOUNGERS—We plant nine feet apart each way, with alternate rows of Miner, Forest Garden, and Wild Goose.

DAY—I object to close planting; make them at least thirty feet apart. I don't believe in crowding trees.

MASTERS—Why do you plant in alternate rows, Mr. Youngers?

YOUNGERS—To effect fertilization.

MASTERS—That's the idea exactly, as some varieties are almost pistillate; the Miner for instance will hardly bear at all when planted alone. I think mixing varieties a good plan but think we should study it. I have a Miner tree thirty feet across the head and would not plant them closer than twenty feet anyway. Would plant about four smaller growing varieties to one Miner.

BARNARD—Close planting is best because it shades the ground; if the trees are inclined to crowd, cut them back. The shading the ground makes it too cool for the Little Turk. I have a thicket of peach trees that are perfectly healthy and they stand the winters better than when planted singly.

DAY—I have close-planted peach trees, but I would set Miners at least forty feet apart and smaller kinds can be set between.

CARPENTER—The Mariana, the much abused, is a veritable godsend to propagators. It grows readily from cuttings, does not sprout, and it makes the best stock we have for budding. I believe in close planting every time and it results in better fertilization. Youngers' orchard is a good example.

MASTERS—Yes, I think the Mariana will make a good stock if it does not sprout. That's the great trouble with most of our plum stocks, they sprout too much. The Chicasa is a bad sprouter. Have been noticing the Abundance plum of late—a new one and I believe a good one. It has large, broad leaves and looks as if it might be a hybrid between some foreign and one of our native varieties.

The discussion may be summed up briefly as follows.

1. Weaver, no good.
2. Wild Goose, Miner, DeSoto, and Forest Garden, best.
3. Plant rather close and alternate varieties.

THE BEST PLUMS.

CARPENTER—U. L. Moore is absent and has not sent in his paper ; let us talk on plums for a few minutes anyway.

YOUNGERS—Wild Goose, Forest Garden, and Miner are the best three.

DAY—I am sorry he stole my thunder ; I was just going to say that myself.

CARPENTER—Have you tried the De Soto.

DAY—Yes ; it is a shy bearer with me ; the Miner has to be fertilized with some other variety ; the Wolf winter killed, it is not nearly so hardy as the Mariana.

BARNARD—The Wolf is full of fruit with us. The Mariana is hardy so far as tree goes, but it is no good for fruit as it never bears.

CARPENTER—The Mariana is no good except for stock on which to bud other varieties ; grows readily from cuttings, does not sprout from the root, and “takes” buds well. The Wolf with us is full of fruit, but we have to travel a long time to find a better plum than the Wild Goose. There is no curculio proof plum, although the Botan., a new Japanese plum, approaches nearly thereto.

PRESIDENT—I asked a certain man not long ago, who is interested in the Mariana, how it was succeeding and he said, “Oh, the *tree* is doing first rate—but there is *not much fruit*.” I tried the *Prunus Simonii* top-worked into Miner, but they never fruited ; then I budded some into native stocks with no better success.

CARPENTER—I expect to have some *Prunus Simonii* at the State Fair this fall that will be fully as large as a Jonathan apple ; they will come from Utah.

A VOICE—If we didn’t know you, Mr. Carpenter, we wouldn’t believe that ! (Laughter.)

YOUNGERS—We sell all our plums at three to four dollars per bushel ; last year we received ten dollars from one Miner plum tree.

PRESIDENT—I think the Quaker is a good plum that is overlooked. I have several trees of that variety and I don’t believe I ever made more money off any fruit than those few Quaker plum trees produced.

THE BEST CHERRIES.

YOUNGERS—Mr. President, I have no paper prepared, but in regard to cherries, I would say there are only three varieties I should class as the best, and they are the Early Richmond, English Morello, and Late Richmond. There may be other good varieties, but I am not acquainted with them. Their season of ripening is about in the order named. Without doubt the English Morello is the best market cherry we grow.

CARPENTER—The Late Richmond is worthless—no good at all; it does not bear to amount to much, and I do not consider it a good variety by any means. The Ostheim and Dyehouse will be the cherries in a short time.

YOUNGERS—How many quarts of Dyehouse did you get per tree?

CARPENTER—Several; fully as much as Early Richmond. The Ostheim is best in flavor, and is a first-class cherry in every sense of the word; it ripens a week before English Morello and is fully as large as that cherry. The Dyehouse is the rankest grower we have.

DAY—I can endorse Youngers in regard to English Morello and Early Richmond, and partially Carpenter's talk. I don't know much about the Ostheim or Dyehouse, but I have a few Wragg. The Wragg fruit is not so good as the English Morello.

YOUNGERS—We have done very well with the Late Richmond.

COLE—I find the "Big 3" doing well nearly everywhere; we should make out a list of the best varieties, as the farmers need such an one.

CARPENTER—Stephens is a pretty successful cherry grower, and he says, "drop the Late Richmond." I say when anything is not good let's drop it.

O. F. SMITH—The English Morello holds its bloom when the Early Richmond gets killed.

DAY—I don't allow our Society to be criticised too severely; we might recommend some fruit for trial and it would turn out unworthy; that is no reason we should keep on recommending it because we did so once. Whenever we find a no good thing throw it out.

REED—The Montmorency comes between Early Richmond and English Morello and I like it better even than the Early Richmond.

PRESIDENT—I like the Montmorency and the Wragg. Now and then in winter the English Morello is hurt by severe freezing, but after the tree gets older it is all right.

C. H. BARNARD—The Montmorency is a perfect success and is just as quick in coming into bearing as any of them.

PRESIDENT—My three cherries would be Early Richmond, Montmorency, and English Morello.

MILLER—I would like to know if growing cherries is profitable.

CARPENTER—There is no other branch of fruit growing more so.

DAY—I think that since I began I have only had two failures in many years. Don't plant your cherry trees where late spring frosts can strike them. The cherry cannot stand so much cold as the apple, but is hardier than the peach.

MILLER—Our cherry crop has been killed several years by freezing in November before the wood was sufficiently matured.

DAY—I think there is some mistake about that as my cherry trees, always mature in August and there is no sappy growth to be injured by November frosts.

A MEMBER—I live in Nemaha county near a creek and many a time there has been frost when my cherry trees have been in full bloom. Have had but four failures in eighteen years.

C. H. BARNARD—We have never lost a full crop since our orchard began bearing.

CARPENTER—My cherry orchard is on a creek bottom.

COMMERCIAL PEAR ORCHARDS.

BY E. F. STEPHENS.

Knowing that I take a great deal of interest in the subject of pears, and in the growing of them in commercial orchards, the secretary has assigned to me this topic.

Growing pears will no doubt be commercially profitable when we have studied the questions connected therewith, and understand how to meet all the difficulties. Much disappointment has been caused in the last fifteen years in the attempt to grow many varieties, partly be-

cause the nature of the pear, and its conditions, were not fully understood, and partly through attempting to grow varieties for which our climate was not adapted. I think along this line we shall find our success easier if we will give more attention to the growing of some special varieties, which, in their nature and habits, are better adapted to our climatic conditions.

So far, I have had some success, and considerable failure, in the growing of pears. Out of all this I am encouraged to believe that certain varieties, with certain methods of treatment, with a proper selection of soil, can be made profitable, commercially ; and with others, failure will be more frequent than success.

In planting my first orchard I erred in making my soil too rich, and pushed the trees too rapidly. Evidently more trees suffer from the tendency to grow too fast and too late in the fall, and to be unripe when winter sets in on immature wood, than from all other causes. Hence we should select soil not too rich, and give such cultivation and care as will ripen the wood early. Be very particular to have the wood thoroughly ripe when winter sets in, and get only a fair annual growth. With these conditions met, and with a proper selection of varieties, there seems to be a fair prospect of commercial success in the growing of pears.

I have 1,000 pear trees in commercial orchard and will plant about 500 more the coming spring. Our plan is to keep the ground cool and moist with heavy mulching of coal ashes. We also scatter salt about the trees ; both applications with a view to keeping up an equable degree of moisture.

Among the leading varieties of pears may be mentioned, Keifer, Sheldon, B. de Anjou, Seckel, Tyson, and Flemish Beauty.

The Flemish Beauty does fairly well, but has shown, this past season, some tendency to blight. We planted of this variety about 200 trees in the orchard ; and where we have planted this variety for other parties we have found it bearing very fairly ; they are choice pears, of good size, and many of the trees loaded with all they can carry. We hear of this pear from many directions as being one of our most promising and fairly reliable varieties.

We regard the Seckel and the Tyson as still less likely to blight. The fruit is not so large and of course will not yield as many bushels to the tree. We have planted freely of both.

Among trees well worthy of mention as very promising may be named the Idaho pear ; originating near Lewiston, Idaho, in a country whose climate is as changeable as ours. The tree has very healthy foliage, probably hardy. The fruit is large and of good quality. Those who can afford to experiment should by all means try it.

Among the varieties that are very promising with us may be noted the Early Harvest. This variety was found near Manchester, on the Ohio river, where trees had attained great size and age, by a Scotch gentleman named Thomas Bigger, and propagated by him ; evidently a choice seedling from French colonial times. The tree is of fairly strong growth and healthy foliage, and seldom shows any tendency to blight. The fruit is of fair size and ripens very early in the summer, with some tendency to rot at the core unless picked before fully ripe ; has a fine color and appearance and ought to make a successful commercial pear. It, however, is not very high in quality and will evidently take its place among the market pears rather than among the dessert pears. We regard this as the healthiest tree that we have in our orchard, having noticed it for a number of years, and very rarely shows any tendency to blight. We have several hundred of them planted and believe that we shall find them commercially profitable and make money from them.

Another pear which we regard as very promising, and has so far proved to be very healthy, is a variety obtained from a Quaker lady in Ohio called the Warner pear. This variety is from a seedling and that from a seedling. It is of fair quality and quite healthy ; the fruit is of fair size, symmetrical in shape, light yellow in color when ripe, a perfect core and few seeds. In quality it is above the average of fall pears but not quite equal to the best ; it is buttery and melting, mild in flavor ; it keeps well and is a good shipper. It ripens from the last of August to the middle of September.

Another variety which we have found very healthy is the Longworth, which we received from F. S. Phoenix, of Bloomington. It is a free and fair grower, of good foliage, but the quality of the fruit we are yet unable to speak of.

We have experimented with a good many varieties of Russian pears. A general report of their behavior by name and number will be found at the bottom of this article. Only a few of this list have been

found desirable. Among those which are the most promising we may mention the Bessimianka.

Among varieties that are hardy and so far no tendency to blight, we notice 15 M., also No. 513 or Limber Twig, 392 or Kurskaya. This variety was first introduced by the Mennonites near Windom, Minnesota, where sound bearing trees of considerable size can now be found, with sound wood and foliage not injured by heat, rust or blight. The fruit is said to be of good quality. Nos. 18 and 391 are also very healthy, and with so far no tendency to injury from blight or cold.

Among the fairly healthy varieties, but not quite equal to the above, are Victorina, No. 361, a variety esteemed in Veronesh, Russia; Flat Bergamot, or No. 396, considered in hardihood about equal to the Wealthy apple tree and reported of good quality, season autumn; also No. 516, Lemon, rated as a hardy tree, fruit suitable for cooking.

Among the Russian varieties that have not done well either as orchard trees or top-worked on our own healthiest pear trees may be mentioned Pound, also No. 358, 4 M., and Sapieganka or No. 520; also Chinesede Engery, a pear of Chinese origin, which we top-work on our Early Harvest.

I have neglected to mention Dewey's Premium, introduced by Smith of Ohio among his promising seedlings and which have fruited two years, top-worked on E. Harvest. We regard this as a very productive, promising variety.

Recent experiments of scientific men seem to indicate that it is possible to check the leaf blight of the pear by spraying with the Bordeaux solution or mixture, the formula for which is as follows: Copper sulphate, six pounds; lime, six pounds; water, twenty-two gallons. In the addition of milk of lime to a solution of copper sulphate, the lime solution precipitates the copper as cupric hydroxide, forming at the same time a slightly soluble sulphate of lime, which two salts and an excess of lime remain in suspension in the Bordeaux mixture. This is applied with a force pump using a vermorel nozzle. For large bearing trees the expense is estimated at six to twelve cents per tree for the season.

DISCUSSION.

DAY—Have you tried salt around your trees?

STEPHENS—We have and the orchard did well.

MASTERS—Pear blight comes from the soil getting too dry around

the roots of the tree and the fact that salt will retain moisture is sufficient to recommend it as a preventive of that disease. I do not think salt has any other virtue in preventing blight than its properties of retaining moisture.

DAY—I had a friend from the east visiting with me and he said in his country pear growers used a great deal of salt to prevent blight.

MASTERS—Well, it does in a measure prevent it, but it is not a sure cure by any means ; its only virtue is what I have stated.

WILLIAMS, of Iowa—Several years ago I planted out three hundred pear trees and now I have four left. I tried filings, scraps, everything in fact but salt, and I don't think that would have saved them unless it had been "White Oak" soil.

CARPENTER—I don't think "White Oak" soil has anything to do with it. Out in Utah they raise good pears and they do not have a soil much different from ours here.

PRESIDENT—Probably they have a "White Oak" climate.

SAMUEL BARNARD—I have got over my hallucination in regard to pears. I grow some but do not pretend to make a business of it ; have six or eight trees growing near some evergreens, so the pears are shaded on the south and west ; this keeps the ground cool and prevents the hot winds from drying up and killing the trees. I generally have some fruit from my pear trees, and I think probably we might raise pears to a considerable extent if we could shade the orchard with evergreens so to keep the ground always cool. I sell a few pear trees because my customers wish them, but I never recommend them as they are a very uncertain tree. Of course it will do no harm to plant a few trees just to experiment with, but I would not advise planting them to any considerable extent, as their cultivation is sure to result in loss. I think, as a Society, we should not advise pears for general planting, but we might recommend them for trial.

STEPHENS—The Yankee always wants to do the impossible, and if you tell him that any certain thing cannot be done, that is the very thing he wants to try ; and he generally succeeds in the end. Although pear growing at present seems to be rather an "up-hill" business, I think eventually we shall overcome the obstacles now in our way, and raise them successfully and profitably. The prices at which pears sell warrant me in saying that if we could raise anything like a full crop, say every other year, we could then make more money from a

pear orchard than from any other source. We shall keep on trying, and in the end we hope to grow them; when we do we shall have the start of you fellows who keep on crying, "you can't raise pears in Nebraska."

MASTERS—I was in Stephens' place twenty-five years ago, but I have got over thinking that way now.

PRESIDENT—Did not apple growing look as unfavorable then as pear growing does now?

MASTERS—No; the outlook for apples was much better then than it is for pears now.

CARPENTER—I know of a pear tree in Jefferson county that has borne over \$50 worth of pears since it was planted.

SAMUEL BARNARD—Rich men can plant pear trees, and it is all right, but for the man who expects to make his living by raising fruit, I think it is folly to recommend pear growing. There are too many trees planted to the amount of fruit produced. I have planted lots of pear trees and have only a few now. No one man has ever made a thorough success of growing this fruit; not one in twenty-five ever succeed.

DAY—Pears are a little like the Louisiana state lottery: we may draw a prize once in a while, but the chances are that we will not. We invest \$50 and get \$1 in return.

CARPENTER—I do not recommend them, but I think we should experiment. I do not think all the Russian varieties are good; some of them are subject to leaf blight.

STEPHENS—The Nebraska horticulturists work against the pear, but I expect to make some money out of mine. The American people try to do the impossible, and if at first they don't succeed they "try, try again." I have spent over \$10,000 in experimenting with fruits, and have learned a dear but good lesson. It is no good to advise people; they won't pay any attention to it any way.

MASTERS—I have a receipt for success, and it will never fail: "Set two trees for every one that dies."

PRESIDENT—I believe it is the sentiment of the Society to let the people plant pear trees, but not to encourage them in it.

PEAR CULTURE.

BY REV. J. H. CREIGHTON.

By request of a member of the State Horticultural Society I write a few thoughts on the culture of the pear.

It used to be said that—

“He that planteth pears
Planteth them for his heirs.”

This is not quite true, yet there is no fruit tree that requires so long a time to be tested and fruited. Of all nursery trees it is the most difficult to manage and get up a good stock. Only an experienced nurseryman can successfully grow the stocks from seed, and then with many failures and loss. Most of our pear trees are worked on stocks brought from France. Writers generally condemn the use of suckers or sprouts from our native trees, but we have known some fine trees raised in that way.

No tree perhaps is more capricious as to the stock it is grafted on. French stocks and our American stocks are the best, but sometimes there is an incongruity between a healthy stock and a healthy graft that cannot be understood. This disagreement may be but slight, but sometimes it is so decided that the bud or graft will kill the stock as if poison was injected into it.

At one time, about forty years ago, it became quite common to work the pear on quince, and it was generally believed that the whole subject of pear culture would be changed. Large orchards were planted and fine fruit was produced. But it was soon found that only a few varieties would grow on the quince, some would grow feebly. Many persons who invested largely found they were left with a multitude of invalids. In some cases the trees were taken up and transplanted so deep that the pear would strike roots above the quince. This would save the life of the tree, and in some cases make a good tree. If this was done the first year we think the result would be good. The claims for dwarfing on the quince was that a much greater number of trees could be planted on an acre, and that the trees would come sooner

into bearing, and that the fruit was somewhat larger. All these claims were true, but experience soon showed that the trees were so short-lived that the claims amounted to nothing.

I am inclined to the belief, after long observation, that if we could have the pear tree on its own roots (root and top the same) our orchards would be more permanent. This would be a slow way to get up a large stock, but it could be done by layering. I think it is well worth the attention of pear growers. It is no easy thing to establish a good pear orchard. The trees are necessarily high priced. Five apple trees can be produced as cheaply as one pear tree. They have but few roots, and are difficult to transplant. After planting they often die suddenly without any apparent cause. In the older states they have been swept off by the thousands with blight. Some large orchards have lived fifteen years or more and born considerable fruit, giving the owner great encouragement, when suddenly, in one season, blight sets in and ruins what was so prosperous and what had been waited on so long. Human life is too short to repeat these investments often. One good thing can be said of the pear tree, when it gets age it is quite free from blight and disease, and it is a long-lived tree. Some have been in bearing more than a century. I think if they were on their own roots they would be more likely to live to a great age.

Blight—As to blight I have but little to say. Much has been written, but little is known. My experience has been that nothing will arrest this disease when it begins. Yet some things may greatly prevent it. Certain varieties are quite free from it, but perhaps none entirely so on all soils and situations. When a young tree blights badly I cut it back severely and I have known very handsome trees forming good tops from this cutting back. This is very easy done, though somewhat uncertain. I never trim my pear trees at all. I let branches come out near the ground, and let the cattle and horses browse the lower limbs. This shortens them in growing time and don't induce growth, but rather retards it. As soon as the fruit begins to get some size the animals are removed. I know this plan will be objected to by many fruit growers. I have some objection to it myself, but my reasons are as follows: The ground must not be plowed, the grass must be kept short, the pasture is worth something. The lower short branches shade the ground and the trunk and pre-

vent blight. I have had less blight than any pear grower in my state (Ohio). The trees are not as handsome as they would be if the horses and cattle were entirely excluded and if the trees were neatly trimmed, but all things considered I think it is the right way. If I had cultivated the ground and trimmed up for beauty I would have lost most of my trees. So I have observed in other grounds in my county. I am not able to say what per cent I have lost by blight, but certainly not more than ten per cent of any one variety. Flemish Beauty was the worst; Seckel and Clargeau the least. I am inclined to the belief that if the trunk of pear trees were shaded from the hot sun it would greatly prevent the blight. I was once in a great convention of fruit growers when the subject of pear blight was being discussed. It was known that Mr. Ellwanger, of the firm of Ellwanger & Barry, was in the house and we all knew that they were the greatest pear growers in this country. We were all waiting to hear Mr. E. At last we called him out, expecting something valuable, but to our great amusement, if not our gratification, he said the way they did at Mt. Hope was when one tree died they planted two in place of it and we always have plenty. This is all he said and took his seat. This is really the right way to raise pears. Plant, plant, plant.

Varieties—As to varieties, they are legion. Amateur culturists have been for many years bringing out new sorts. Seedlings and hybrids without number still claim our attention. Many of these are figured in horticultural journals and praised by those that have them for sale, but they nearly all drop out of notice in a few years. There is also a large number of what is commonly called local fruit, that is, those only known in certain localities. Of this class there is not one in a hundred that is fit for cultivation. Indeed I have never met with any that was fit to eat. After all that has been said and published about new and improved sorts there is only about half a dozen that are profitable for orchard culture. Experimenters have established some facts that may be of use to us. The seedlings of our best sorts are not the most promising for new varieties. For instance no seedling from a Bartlett or from a Seckel has ever equalled the parent. Van Marz first discovered this, and successive trials confirm it.

If any one would try his lottery luck he should take the seeds of

a second rate pear rather than of a first rate one. Nature seems to have done her best to produce a Bartlett or a Seckel, and gone to the very verge of possibility, so the next step is backward. But the seeds of a second rate fruit may, once in a thousand trials, go forward. If the doctrine of the survival of the fittest, by natural selection, is true, certainly nobody has lived long enough to prove it. If the author of that much quoted sentence had said the survival of the fittest by *artificial* selection, he would have come nearer the truth. Left to natural selections we have scarcely any hope at all. The tendency, a thousand to one, seems to be to the *un-fittest*. I once had a fine lot of seedlings from the Seckel, and had a mind to fruit them, but thought I would ask Charles Downing first. He said not one chance in five hundred or a thousand. That they would have produced a great many kinds of fruit I have no doubt, for they were of very different appearance. Some were thorny, some smooth, some weak, and some strong.

I would not discourage any one from trying experiments, for in this way we gain knowledge. In horticulture not much is learned by mere induction, but rather by experiment. Much of my life has been spent in experimenting, and though I have made so many failures, I do not regret this way of obtaining knowledge. Sometimes, when we fail in the thing desired, we find some other valuable truth. It was while they were boring for salt that they found oil and gas. Experimenting with the pear requires greater time and patience than with any other fruit. To test a new pear for general cultivation, taking into account all the qualities necessary, will require twenty or thirty years. The owner of a new pear may say so many good things and true things about his fruit that it would seem to be almost perfect, yet it may have some one defect that renders it entirely unfit for the general list. I have seventy-five large, beautiful pear trees, twenty years old, free from blight, fruit of the largest size, of exquisite flavor, unsurpassed in beauty, and yet these seventy-five trees have never produced seventy-five cents worth of fruit since they were planted. They are what we call *shy bearers*.

As to the varieties that have come under my observation, and that seem to do well in a wide range of country, I will mention a few:

Bartlett stands first for profit. The tree is irregular, and ugly in form, but a good grower, tolerably free from blight, bears young and abundantly; fruit, large, handsome, and nearly first rate.

Seckel is a standard old sort, widely known. Tree, handsome, symmetrical, healthy, stocky, long-lived, seldom blights in any soil, bears when about five years old; fruit, small, reddish-brown, of the highest and richest flavor of any pear known. It ripens its fruit gradually during a space of two or three weeks. It is very unsalable till known. I should think in the rich soil of Nebraska it would do well and be larger. It is so widely tested that there would be little risk in planting it.

Clargeau—This is a pear of the largest size and of great beauty. The tree is a slow grower, but stocky and healthy. Bears younger than any sort yet known. With me it has been entirely free from blight. Quality second rate, but so showy that it sells readily. One hundred and fifty trees might be planted on an acre of ground and would not be crowded.

Louise Bonne de Jersey—This is a great grower and bearer, and the fruit of sprightly, excellent flavor, but not as free from blight as many others.

Keiffer—This is the only new sort I care to notice. It is the greatest grower of all. It mounts up with wonderful rapidity and robustness, and differing from all other fast growers, it bears young. It is said to be very free from blight. The fruit is large and smooth, perfectly beautiful, with a crimson cheek. The quality depends on circumstances. Of a long season, or when raised in the south, it is good; but of a short season, or in the north, it will not ripen. About Philadelphia there are large orchards of it, and where it has been sold in that market at a high rate. Mr. Hovey, of Boston, said that of eight hundred sorts it was the *poorest*. We think it has come to stay. It is good to cook, and will always sell in market. It can be raised much cheaper than any other kind. Any handsome pear will sell well. People are with fruit as with books, any book that is much praised will sell well. I have been in the market where people were buying pears that an old hog would hardly eat and paying a high price for them while not two rods off they might have bought the delicious *Seckel* for half the money.

As to early pears I have but a little to say. They are generally unprofitable.

Bloodgood—I consider one of the best. Next to it it and even better in flavor is the *Sumner Doyenne*. But all this class are so perishable that this should be planted sparingly.

White Doyenne—I mention this old pear, not to recommend it but to suggest that it be tried in Nebraska soil. It was once the queen of all pears but is now discarded on account of cracking. The tree is a good grower and great bearer and the fruit is medium in size and very handsome. For delicate flavor when in perfection nothing can surpass it. Being discouraged with it on account of the cracking, I double worked it with Clargeau. Now for two or three years the trees that were left unworked do not seem to crack much.

Nebraska Soil—Nothing can be certainly known of soil till tried, but from one fact I have observed in this country I should think this a good soil for pears. It is well known that a wet soil, or a soil very retentive of water, is very bad for the pear. On the contrary I notice that the soil here dries up quickly. After a heavy rain here the streets are dry in a few hours. There is scarcely any place in Ohio where unpaved streets in such a town as Crete would not be impassable in a very short time. But here the streets are not paved and yet the mud is of little consequence. Now it is a well established opinion that the pear is particularly impatient of much moisture, or as the old writers used to say, of a *wet foot*. As to the varieties that should be planted here I am not competent to decide, but from my observation I would plant very much in the order above named, and would plant but few varieties. As to an experimental station, it is good as far as it goes, but we need reports from many parts of the country and for many years in succession. If I was asked for the greatest hindrance to the pear culture I should say *ignorance* and *impatience*. Any man that will plant two for every one that dies will certainly be successful in having plenty of this delicious fruit.

DISCUSSION.

STEPHENS—Is there anything in the use of salt?

CREIGHTON—I have never used anything of the sort, nor any manure.

THE PRESIDENT—I would ask Mr. Stephens how his pear trees are doing.

STEPHENS—The Longworth has never blighted, have had it five or six years and it does not show any signs of the disease. The Early Harvest has fruited with us. Seckel is a very promising variety. Keiffer good. The Flemish Beauty is blighting some. We manured

our pear orchard too heavily and induced too large a growth on the trees. I am satisfied a pear tree to be healthy should not grow more than eighteen inches in a year.

THE ORCHARD.

BY JONATHAN I. SOUTHWICK.

BENNETT, NEBR., January 15, 1890.

Secretary of the Nebraska Fruit Growers' Society and Members in General: The weather being so cold it does not seem prudent for me to venture out.

I wish to give a few hints on the orchard, having had some chance for observation.

I would say to those intending to plant an orchard :

First—Visit the nurseries you intend to procure the trees from, even if it does cost you something. Observe the manner they are cared for. Don't be fooled with agents that carry roots to show that a tree is just as good as those that are budded a foot above ground, and is better than one with roots on the graft. When I run my nursery I had no trouble among those that were posted to get twenty cents for layers as fast as they were ready, while it was slow sale for budded trees.

Second—Do not take a tree that has been pruned in summer, for such trees are more liable to white (or thread rot) than those that are trimmed in winter or spring.

Third—Ascertain the way they are to be dug up and the amount of roots they are to have. (I would rather have a tree two feet high with a good supply of roots than one six feet high with few roots.)

Fourth—Low tops with horizontal limbs are to be preferred ; also those that the spurs are all on the stem of the tree, which may be removed after the tree has been set two or three years, and the body has got sufficiently stiff to hold its position against our heavy southwest winds.

Fifth—Preparing the ground is of greater importance than most are aware of. It should be cultivated ; it is best in corn for two years, then one in oats, and then plow shallow and fine as soon as the

oats are off, so that the oats and weeds will start before frost, then cross-plow very deep—ten inches—late in the fall and plank thoroughly at each plowing; then in the spring stick a small stake where each tree is to be put; then take a piece of board six inches wide or more and six feet long, cut a notch in the middle to fit the tree and stake, then bore a hole near each end to put two stakes in (exactly the same distance from the notch and in line with the notch); set the notch against the stake; where the tree is to be, put a stake in each hole; then pull the stake in the notch and put the tree in the notch and mark at least six inches outside the roots; take up the board and dig your hole ten inches deep or more. Replace the board, put the tree in the notch pointing to the sun at two o'clock, and fill with the top soil that has been freezing and thawing the past winter. See that the roots are well straightened and no part that is not well filled with fine earth. If the ground is very dry, a bucketful of water will do no harm, rather helpful, but cover the wet soil with dry. If the ground was not plowed the last time ten inches deep, it better be spaded that deep for four feet around the tree; leave a small basin around the tree to take the rain and sun. If it is very dry at any time in summer scrape away the earth an inch or two deep and water freely and then cover all the wet dirt to prevent baking. Trim back one-third of last year's growth. Sprinkle the tops often with water to prevent the bark from withering and keep the buds soft. And you will find much more fruit and sooner, than plant where the ground is in a crude state.

Old orchard pruning late in winter or early in spring; thought and method are required to produce good results. I have seen valuable orchards that were really killed by bad pruning; also, orchards that really died for want of proper pruning; here perhaps many will hiss, but hiss as you will, it is a fact that if too many large limbs are left on a tree, it soon puts the foliage too far from the roots to keep the bark soft, so the tree becomes hide-bound and all is over. The surface where the limbs are cut off should be left to dry for five or ten ten days before coating, not sooner. Never prune when the sap is flowing, as the cuts do not dry well, and in some instances keep sap running until summer, when insects infest and hinder healing.

Approach the tree on the northeast side; trace around to the left; future relation of each branch should be studied, as affected by growth,

weight of fruit, etc. ; cut away all the decayed limbs, or those tending thereto. The removal of large limbs does not hurt the tree so much as to leave decayed ones on. Always make your opening on the northeast side. This lets the sun in in the morning when the dew is on and the sun gives little heat. The southwest side should be kept thick and strong. The top should be thinned in accord with the natural habits and growth. For instance, Dominie thicken enough ; the Willow too much. Where the top thickens too much, cut longer branches ; if too little, trim more, as you would a hedge.

Manuring is all right on thin, poor soil ; on better soil no manure is needed until in heavy fruiting. No manure should be put close to the tree in any case, as it induces the bark to crack in winter. A good pile of soil is the best mulch for summer or winter.

Motto No. 1.—A basin for the sun and rain, until there has been a pretty heavy rain ; then fill to the surface.

Motto No. 2—

He that fails to cut big limbs
When into his orchard he goes and trims,
Whether he tops them low or tops them high,
Be sure that orchard is soon to die.

With kind regards, your friend,

JONATHAN I. SOUTHWICK.

GRAFTING STONE FRUITS.

BY GEO. W. STURTZ.

The cions should be cut when the wood is not frozen, and packed in the cellar in dry forest leaves.

In root-grafting the cherry use the Mazzard stock with long cion (about six inches) and plant deep to prevent winter killing until roots have emitted from the cion. Imported roots are preferable, because those grown in our climate lack root starch on account of the common leaf mildew. Graft at the crown, using the side-graft. Make the wedge on the cion a little thicker on the outside where it joins the cambium layer of the stock. Be careful not to make the wedge so thin on the inside that it will not rest on the wood of the inside of

the stock, in which case the graft turns black at this point and a fungus growth usually sets in and ruins the graft. The root should be cut about six inches long, as in the pear, so as to include the part emitting fibrous roots. Make the wax by heating slowly white resin with about ten per cent beeswax; when melted, let it partially cool, then add alcohol until about the consistency of thick molasses. Apply with the finger, being careful not to get it too hot. Make only two or three cions at a time, then place and wax them, covering cut surfaces and end of cion, and roll at once in dry sand, which will prevent the grafts from sticking together. Pack in boxes with sand or moss, not above the point of union, and set in a cool, dry cellar or cave. Be careful to keep the cions dry until used, and then not allow them to absorb moisture except from the stock after united. The best variety of Mazzard stocks are known as *Cerasus Avinum*, and are imported from eastern France. This applies to the root-grafting of the cherry, apricot, plum, and peach.

Seedlings of our native plums make the best stocks for grafting European or native varieties. For the cultivated varieties of the Chickasaw race peach seedlings make the best stocks. If used with a long cion they are hardy, and give good root for transplanting.

Top-grafting of the stone fruits should be done early in March while the stock is dormant, and the cions should show no signs of granulation at the base, or starting of buds. Use the same graft and wax the same as in root-grafting. Wrap the waxed portion with a white rag to prevent the sun from melting the wax. In top-grafting we set the dish containing the wax on top of a sheet iron can, made with a door in the side to admit a lamp, which keeps the wax warm enough for use.

A FEW REMARKS.

GRAND ISLAND, NEB.

G. J. Carpenter, Fairbury, Neb: DEAR SIR—I have received your *Nebraska Horticulturist* and have with interest read your leader on "Forestry." With a few exceptions, I consider the advice you give good and sound. My experience (of thirty years) tells me that *Ailanthus* should be discarded on account of tenderness and its objectionable suckering proclivities. I also differ with you as to the

best tree for wind-breaks north of the Platte river. It certainly is not the box-elder, *but pre-eminently* the white or so-called gray Russian willow. All the rest you say in your excellent article, I heartily endorse.

As to the planting of apple trees and pear trees, I have very little to say, my orchard being on low bottom land, hence not suitably located. Even the Ben Davis are all dying with me. Pears all failed. On high rolling and deep soil I think that success will follow. With me, in my location, it is useless.

My apple orchard is badly thinned out, and I have a notion to try replanting with Russian apricots. I have tried quite a number of varieties of the Russian apples, but find the fruit very much inferior to our native apples, all late varieties becoming with me early summer apples.

About crabs blighting, my experience is that Whitney No. 20 *does blight*, but not as badly as does Transcendant. About the Elvira, I would say that it is comparatively hardy, but not ironclad.

About the best evergreens, I would have answered the red cedar, and *pre-eminently* the silver spruce of the Rocky mountains.

As to grapes, I beg leave to give you *my opinion* thus: The Concord is yet the grape for the million. Should I make a selection of those you enumerate (and I have grown nearly all those varieties you name for many years) I would prefer to plant Concord, Brighton, Champion, Delaware, Diana, Martha, Moore's Early, Telegraph, Lady, Worden, Cottage, Perkins, Elvira, and a few varieties you do not name. In general, you are correct, I think, about what you say about the grapes, and all I could add is as follows: Delaware does best if grafted on the root of our wild grapes, and then even poor soil is good enough for this, the finest of all our grapes. The Cottage is one of our very best black grapes, and should be "*boomed*." The Goethe (although my favorite poet) I would discard entirely for Nebraska, *is too late in ripening*. Noah mildews every year badly, in other ways the hardiest vine of all we have got; it may do well on high elevated locations. Elvira is good for *wine*; as a table grape I *do not* want it.

In conclusion of this rambling remarks, I desire to say: that my notion about rational forest culture in our prairie country is to precede the planting of hard wood and more valuable trees by planting

first the short lived, soft wood trees, in particular the cottonwood, but at the same time intermix with ash and black walnuts. My forest culture, as carried on now for thirty years, has proved success along this line, of the many experiments I have made, and I invite you to call and see for yourself.

Wishing you unbounded success in your endeavors to advance the interest of forestry and horticulture, I remain, yours very truly,

WM. STOLLEY.

HOW TO GROW NURSERY STOCK IN NORTH-WESTERN NEBRASKA.

BY W. F. JENKINS.

This subject is one that needs more experience than any of us have been able to obtain. The northwestern part of the state is still a new country. My experience and observation does not extend in this direction further than Loup county. The first nursery established in this part of the state was planted by one Mr. Alderman, near Fort Hartsuff, eleven miles northwest of Ord, in the spring of 1879. For three years his nursery stock did very well, and his prospects for success were quite flattering, when the worst hail storm that ever visited this part of the state since it was settled completely destroyed everything above the ground. Mr. Alderman was discouraged and never replanted. This was the end of the first nursery in Valley county. In 1885 I established the Arcadia nursery. My observation convinces me that the best locality for a nursery in this part of Nebraska is high table-land, just rolling enough to afford natural drainage. All of our table-lands are rich enough to grow nursery stock without any fertilizer. As a rule we have no frosts to do any damage on the table-lands, either in spring or fall, for from ten to fifteen days after there has been heavy frosts in the low valleys and river bottoms.

In preparing the ground I would use the same care and cultivation necessary in any other part of the state. I prefer planting in wider rows than is customary among nurserymen where lands are more expensive than they are here. I can grow stockier and more evenly-

headed trees in rows four and one-half feet wide, and planted twelve inches in the rows, than I can by closer planting. In order to have the best success in planting grafts we must plant as early as the soil and weather will permit. Plant as deep as it will do to plant them and as firmly as possible without injury to the graft. We believe in thorough cultivation from the start to the finish, but would not use the cultivator after the first of July, leaving the ground as level as possible. From this on we shave the ground with sharp hoes until frosts kill the weeds. I can see no benefits to be derived by letting weeds grow in any part of the nursery any time during the season. The appearance of clean, well kept grounds has a very favorable influence on those visiting the nursery, besides being a source of great satisfaction to the proprietor or manager of the grounds.

The last two years we have adopted the plan of laying down our yearling apple trees, as well as all shrubs, that are not perfectly hardy and covering them with earth. It takes two men to do this work to the best advantage, one man will take hold of the tree with one hand near the ground, the other two-thirds the way to the top, the other man with a spade will take away a little earth next the tree on the side where the tree is to be laid down, the man who has hold of the tree will quickly lay it down flat on the ground. The man with the spade will then cover it with earth. In this way two men can lay down and cover 3,000 largest sized yearling trees in a day. We lay them all towards the south, and never spoil a tree, unless it is already damaged, either in the root or body. In this way we thoroughly protect our young trees from the rabbits, which otherwise would girdle and cut off a great many of them. It is also a perfect protection against the most severe winter weather. I am well satisfied with the results of this practice.

I think that proper pruning in the nursery is of great importance, so much so that in my judgment a tree cannot be a first-class tree unless it be properly pruned from the start. The nurseryman should know how the tree should be formed to be adapted to the locality in which it is to be planted better than the average man who plants them. Many of our patrons have lately come from states where trees are headed high; they have not had the time to investigate or the experience to teach them just how the tree should be pruned in this country. It is the nurseryman's business to form the heads of

his trees before they leave the nursery. The first year there is very little pruning to be done; the second spring we rub off the buds and form the head from sixteen to twenty inches above the ground. I don't prune higher than where the head begins to form except to balance the head or to cut out a branch that is likely to make a fork.

We cover our raspberry tips between the 25th of August and the 1st of September, and always have good strong roots.

I am just beginning to learn how to grow forest tree seedlings. In this part of the state box-elder and ash are the principal trees grown and planted on timber claims. Until this season I have planted on old ground and have lost a good many thousand every spring just as they were coming up, by being covered by the soil washing over them, even on ground so near level that one would think there would be no danger of loss in this respect. This year I have planted on new ground prepared as follows: Broke about three inches deep, in June; back-set two inches deeper, in August; then dragged until it was smooth; plowed about one inch deeper, in October; then we used a disk pulverizer one day to the acre. In this way new ground can be put in splendid condition, and I am satisfied that new land prepared in this way and seed sown in the fall will give better results than when planted on old ground.

I have not had satisfactory results growing grape vines from cuttings. We have no trouble in making them grow after they are rooted. We can buy good vines for less money than it costs to grow them here.

I plant currant and gooseberry cuttings in the fall. I have them planted deep enough to be all out of sight. We mulch the rows with stable litter in December and rake off before they sprout in spring.

Success in fruit growing depends largely upon whether the nurseryman furnishes the proper varieties. Many times we have to use all our persuasive powers to convince some of our patrons that they cannot grow all the varieties of apples or other fruits here that they did in New York or Kentucky. We must inform ourselves just as fast as possible what varieties are the best adapted to the locality where they are to be planted. I am satisfied that not one-third of the fruit trees sold in this district is adapted to this locality. Very often purchasers do not know what they should plant, and traveling salesmen

sell the same varieties here that they would sell in Missouri or Kansas. We must learn what is adapted to our locality and cut our lists down to those varieties.

FORESTRY.

BY E. F. STEPHENS.

Possibly some things gained in our experience in the last few years in the planting of timber claims may be useful to some of the people of Nebraska. We find that the varieties which succeed well in the eastern and central portions of Nebraska are not so desirable in the extreme west on higher elevation. For instance, the catalpa, which we find a very valuable tree in eastern and central Nebraska, is apt to winter kill in the northwestern part of the state; also, the Russian mulberry. In the extreme northwestern parts of the state, on those high elevations, we have found that the mulberry is inclined to grow a little too late in the fall, or, perhaps we may say, that the first freezes come a little too early for it there, although it stands the drouth remarkably well and does not seem to ever kill entirely out; the tips of the branches are injured from year to year and this makes the tree more shrubby and bushy than in this part of the state. In the eastern and central portions of Nebraska we find the Russian mulberry to be one of the best growers that we have, shading the ground quickly and standing the drouth remarkably well. We cut one tree a year ago last winter, eleven years old and twenty-five feet in height and ten inches in diameter. It makes a very good post, the fruit is valuable for birds, and it makes a remarkably good wind-break, two rows being equal to four or five rows of most other kinds of timber for wind-break. We would advise planting it for a farm wind-break. We have found the box-elder a fair tree all over the west where the cultivation was thorough and suitable. If the ground is allowed to dry out very badly from lack of careful cultivation and the fall and winter are very dry, then the box-elder is sometimes inclined to injure in the top. We infer that is because the seed from which the trees were grown were all developed on a much lower level and under very different conditions from those which they are finally to meet in the northwestern part of the

state, and we are satisfied from what we have seen that as soon as they grow plants in the northwestern part of the state from seed grown there, that the box-elder will become acclimated in that part of the state, and will stand anything that they ever have there. From about the west side of Lincoln county east the box-elder does extremely well, does not injure in any way and makes a very rapid growth, and we have found that timber claims planted largely with the box-elder or catalpa from there east will shade out the weeds in a very short space of time. We have had box-elders completely shade out the weeds in a little over two years. In three years it was impossible to get through the timber with a horse and needing no further work. We can say the same of the catalpa on soils and in localities where the catalpa has succeeded. We have, particularly, had very good success with the catalpa in Chase county near the Colorado line, where we planted about 300,000 of them on one contract, and we find they have done remarkably well. Something, I think, depends on the character of the soil and on its ability to retain a fair degree of moisture both summer and winter. Wherever there is a liability to excessive drouth, summer, fall, or winter, then the ash seems to be the most successful tree we have so far handled. But unfortunately it is a slow grower under such conditions, and requires five or six years' cultivation to get it large enough to take care of itself. Of course this increases the expense of establishing a plantation. We are inclined to think that we shall be obliged to use mostly of this tree on the highest tables we are planting near the western edge of the state and in eastern Colorado. It is a very sure tree and will stand the extreme drouth as well as the dry and arid winters of those localities. We have succeeded fairly well with black locust, not only in central Nebraska, but in the western part of the state and in eastern Colorado, and the tree is gaining in favor. Its value for posts is well known, and if it proves to be well adapted to those localities, I think the call for it will rapidly increase. Our experience with all these trees indicates that there is no portion of Nebraska so dry or so difficult to handle but what careful preparation of the soil, planting with nursery grown trees, and careful cultivation for the periods above indicated will establish a good growth, and that this method of procuring land is much cheaper than pre-empting or homesteading, even if the value of the tree is rated as nothing, and there is no portion of the state where a fine grove, seven

or eight years planted, is not to be considered of great value. Speaking as a nurseryman, we think that the demand for forest trees is largely dependent on the timber culture law, and should the present law be repealed, we would warn our brother nurserymen that it is not advisable to grow large stocks of forest trees, because the timber claim planting forms four-fifths of all the forest tree trade, and whenever that law is repealed, we may expect a very small demand for forest tree seedlings, as the average homesteader is usually too poor to purchase for the improvement of his homestead, and others put it off from time to time for a more convenient season, although all will agree that the improvement of trees greatly enhances the value of property.

DISCUSSION.

CAMP—I am very much opposed to black locust, the borers work in it so much that it is almost impossible to raise a tree to any size. I think the American sweet chestnut is a valuable tree and it does well here, too.

SMITH—I think black locust will do better in the northwest than here; it is a very valuable tree if the borers do not attack it.

CAMP—My trees are literally ruined—just cut to pieces, you might say.

CARPENTER—Near Brownville, Neb., there are black locust trees two feet in diameter, and they are perfectly healthy. I think, owing to our high altitude, the borers are not so destructive as in Illinois or some of the eastern states. In Denver, and in Utah, I have seen fine trees, eighteen inches in diameter.

SMITH—I would like to ask if any one has had experience in planting trees on timber claims, in the fall?

BROWN—Five or six years ago I planted a claim in the fall, for a friend, whose time has nearly expired, and he was obliged to plant them, or lose his claim; fully three-fourths of the trees grew, and made a fine, thrifty growth.

SMITH—I have tried fall planting, and succeeded so well, I would rather risk it than spring planting. I plant deep in the fall, and then cultivate well the next spring.

CARPENTER—We should plant a mixture, instead of whole plantations, of any one tree. Without doubt the ash is our best forest

tree, where everything is considered, but I would advise planting box-elder and catalpa along with it.

PRESIDENT—The hackberry is a good tree, and should be planted on every farm.

CARPENTER—A year or so ago we bought some Scotch elm from a European nursery, and after we planted them, they proved to be nothing but our common hackberry.

REED—Is not the hackberry a western tree?

CARPENTER—No other tree covers as large an area as it does; we find it in the eastern states, and in every state from there to the Rocky mountains.

CAMP—The hickory is a splendid tree, and I find it generally neglected.

CARPENTER—I think the pecan is our best hickory, and it is a very profitable tree to plant; it is very hardy in this state, and produces excellent nuts.

FOREST TREES FOR THE PLAINS.

BY JAMES A. GAGE.

I have made a few notes but have not prepared a regular paper.

The main thing is to tell what we have learned. We plant trees for posts, wind-breaks, and fuel, and the question is to find the best trees for each use. We have two trees that excel for fence posts, catalpa and black locust. These are better than any other varieties, but they have their faults. Many people are afraid to plant black locust on account of borers, but there does not seem to be the same difficulty here in this respect as in Illinois and states further east.

Catalpa is uncertain in the west and northwest parts of Nebraska, but it is a trying climate there on any tree; western Nebraska has an elevation of 5,000 feet above the sea and this makes a wonderful difference on tree-growing. Catalpa is grown successfully over a good portion of the state, but I would not advise planting whole groves of it alone; a mixture of several varieties is better.

Ash is the tree for fuel; although not a fast grower it is sure and persistent, and if cut in its dormant state makes good fence posts.

A grove of ash, catalpa, and black locust makes as valuable one as we could possibly plant.

For wind-breaks there is nothing better than red cedar and Scotch pine, and most farmers can afford money enough to plant a good evergreen wind-break. The Russian mulberry make a good wind-break, too, and if properly trimmed can be trained into a fine ornamental hedge.

The elm is a good tree, but ash covers all the elm's good qualities.

There has been much ado made over the black walnut, but I don't think many of us will get much good from the ones we set out. A man should be very young to reap much benefit from black walnut of his own planting, especially if grown on upland. It is a gross feeder, requires much moisture, and is a slow grower away from the bottom land.

DISCUSSION.

PRESIDENT—I have an anonymous article here purporting to have been clipped from the *Baraboo (Wis.) Republic*, and which has been sent to nearly every person in this state who is interested in forestry. It claims that the present timber culture laws work a hardship on the settler by compelling him to raise ten acres of trees in order to obtain title to 160 acres of land, and this in regions where it is impossible to do so. And the western congressmen are asked to use every possible means to have the present law repealed and a substitute passed, allowing the present timber claimants to pay for their land in the same way that homesteads are now commuted. Mr. Stephens has prepared an article defending the present law, and will now read it to you.

THE TIMBER CULTURE LAW.

G. J. Carpenter, Secretary of the Nebraska Horticultural Society:
 DEAR SIR—Replying to yours of January suggesting that I write something in answer to an article which appeared in the *Baraboo (Wis.) Republic* of December 18, urging the repeal of the timber culture law, on the ground that over a very considerable area of the Dakotas and other states and territories it was practically impossible to raise trees, and that those who had entered timber claims were obliged to perform the impossible; it seems to me that for some years

there has been a great amount of ignorance regarding this subject. It is quite true that many people have filed on timber claims and expended considerable money and have not met with encouraging success.

A careful study of this subject, and an experience of planting more than 6,000,000 trees on timber claims in western Nebraska and Colorado, leads me to feel that the difficulties described in the article noted above are almost wholly due to the ignorance of the proper methods of tree planting, and to a bad choice with which to plant rather than to our climatic difficulties.

There is no question but that forest trees can be raised with very much less moisture than would be required for raising corn, even for raising corn stalks without ears, and that there is very little area, if any, east of the Rocky mountains, where nature does not give moisture enough, if properly handled, to raise forest trees under the timber culture act. We have, in our experience, achieved excellent success in growing trees without a particle of aid from irrigation, on the high and dry tables of western Nebraska and eastern Colorado, where the soil had not been wet down more than eighteen inches, and where the annual rainfall did not exceed eight inches. We feel sure that most of the troubles, so aptly described by the paper in question, were due rather to the planting of seed and river-pulled trees, on ground improperly prepared and not sufficiently cultivated, than to any insurmountable difficulties in the way. We find that to achieve success we must thoroughly prepare the ground. It should be plowed about twice as deep as the average western farmer plows his soil—say not less than eight or nine inches—and it should be thoroughly pulverized that it may retain moisture; that the trees should be nursery-grown and of the best grade, to be carefully planted and so thoroughly cultivated as not to allow the moisture to be dissipated between. Using these precautions we have no difficulty in securing an average stand, averaging more than three times the amount required by the rulings of the department. Sometimes we attain an average stand for an entire season of three and a half times the amount required by the department, or from eighty-five to ninety per cent of all the trees planted, planting 28,000 trees on each timber claim. These growing trees and this cultivated surface catches more of the rainfall, lodges more of the drifting snow, which, melting, soaks deeper into the sub-

soil, and by the time the trees are large enough to require more moisture the subsoil has been wet down to a depth of three or four feet and eventually, much deeper, giving the larger trees all the moisture they will finally need when attaining such size as to need a great deal of moisture.

Our experience and observation for the past eighteen years leads us to believe that the timber culture act is really one of the easiest and cheapest methods of acquiring a hundred and sixty acres of land and that the fortunate possessor of a claim of this character can well afford to meet the easy requirements of the act, and plant and maintain ten acres of thrifty timber, which shall be an advantage to the community and ultimately a benefit to the climate as well as financially advantageous to the planter of the claim. I should very much regret to see this beneficent act repealed, because, in our whole state of Nebraska, there has annually been planted on timber claims not less than 50,000,000 trees, and our experience in the business leads us to believe that the repeal of the timber culture law would cut down the annual planting of forest trees in Nebraska to less than one-fourth of the amount now annually planted.

Regarding the rulings of the department, that timber claims may not be proved upon until the trees have been growing eight years. We think this ruling was led up to by the too frequent habit of the the owners of timber claims proving up as soon as allowed to do so by the department, and too frequently neglecting the growth from that time forward, and in many cases the groves did not contain enough trees to shade out the annual growth of weeds, which not only dissipated the moisture from the trees but increased the danger from the annual prairie fires. With this in view it seems to me that the department would be certainly justified in requiring that the cultivation of the timber should be so thoroughly effective, and the stand of timber such as would completely shade out the weed growth, so that it will afterwards make the grove permanent and lasting value to the community, as well as the means by which the owner acquires 160 acres of choice land. It seems to me that to accomplish the purpose intended by the beneficent act known as the timber culture law, the requirements of the department should be still more rigorous than they have been in the past in regard to a complete stand of timber in number not less than 13,500 for each ten acres, and these should be

cultivated until they fairly shade out the weeds, or until they have attained such size and age as will make the grove thereafter self-supporting.

The average timber claim in the first ten or twelve years of the operation of the law did not always have timber enough to shade out the weeds completely so as to give the trees remaining in the ground all the moisture obtainable and go forward and make the best possible growth.

It seems to me that the rulings of the department have so far been as liberal as we could desire, and as liberal as were safe when we consider the ultimate value of the grove, both to the owner and to the public deeply interested in its success.

We are not, as foresters, justified in urging the adoption by the department of any rulings which would make the planting of timber simply the means of acquiring for each planter 160 acres of land, but we should use our influence to maintain such rulings and such public opinion sustaining these rulings as will make these groves, which are now being planted on almost every section in the western portion of the state, permanent groves of valuable timber, which will be of great value to the community for long years to come, as well as of direct value to the owner of the forest and farm.

I presume we have all met a great many people who are trying simply to keep inside of the law, and the rulings of the department, with little regard to the ultimate value of the timber, and to maintain such vigorous growth as would ultimately make a grove valuable to the community as well as to acquire land for themselves. Our influence as horticulturists should seek to maintain, in such a state of public sentiment, and to encourage such rulings of the department as would result in the growth of timber.

It is not the purpose of this article to teach the proper methods of planting, but to unite our influence as horticulturists to secure better methods of planting, more careful cultivation, a better class of timber on our public domain and the continued operation of the timber culture law.

E. F. STEPHENS.

TREE TOPICS.

FROM THE NESS CITY (KAS.) TIMES.

Being a brief account of the forestry meeting held at Ness City, Kansas, February 13, 1890, conducted by Hon. Martin Allen, state forester, Hays City, Kansas.

As previously announced Martin Allen met our people here on the 13th inst. to discuss the question of tree growing. He was greeted by a good sized audience, many being present from distant parts of the country, but for the benefit of those unable to attend we publish a part of the proceedings.

On motion, R. B. Linville was elected chairman and Frank Morey secretary.

Mr. Allen is one of the "old timers" and began his address by quoting several early reminiscences. He was at Fort Hays in its infancy when a dispatch was received announcing the murder of the Jordan family on the Walnut. Ness county was unknown at that time. He said we often complained of drouth but even the eastern part of the state had known a worse drouth than we had ever had. In 1859 he had seen eastern Kansas for one and one-half years so dry that the ground was not wet one-half inch in depth.

An interesting paper, entitled "Firewood for the Plains," was next read, in which the lecturer stated that by the "Plains" he meant that scope of country between Fort Hays on the east (where there were still 100 acres of natural forest standing) and the Rocky mountains on the west, and extending north to the British possessions, and to the Gulf of Mexico on the south. About 24,000 square miles of this country were situated in western Kansas. If all the timber in this area was cut and equally distributed among each family there would not be enough fuel to last three days in winter time. The question then, what shall we do for firewood? was a very serious one. The economical methods of the Russians of Ellis county in burning straw in clay ovens was described and the merits of cornstalks, willows, and surface coal was discussed, not forgetting the fact that the best natural kindling that we have is the fine limbs of the peach tree which have

been dead a year or two. All of the above and similar material at best could be nothing more than substitutes for real wood. For an annual crop of actual firewood there was no better way known than to plant an acre or two of ailanthus trees and cultivate the same.

In the fall cut the season's growth to the ground and burn for fuel. At the end of the second fall there would be a crop of firewood to cut from each tree, consisting of three or four stalks the size of a broom handle, which would annually increase in size as the roots of the tree grew older. Its semi-tropical foliage and deep, penetrating roots enables it to withstand the drouths completely. It is easily grown from seed sown at corn planting time or from root cuttings.

At the close of this paper the speaker announced that he was sent here for the benefit of his audience, and he knew of no way to quicker get at their wishes than for them to ask him questions. The following queries were then asked by various ones:

How much do ailanthus cost per thousand? From \$2 to \$3.

Are they useful as shade trees? No, sir; for the reason that they grow so fast that they winter-kill somewhat, and because it is such a fast grower is exactly why it is so valuable for fuel.

How tall does it grow? I have seen the sprouts grow eight feet in one season.

Do you recommend planting the seed in field where wanted? Most emphatically I do not; have never yet seen a grove or timber claim with a successful stand of timber that was grown from small seeds planted where the tree was wanted. The weeds start as quickly as the tree seeds do, and the labor of keeping these little trees from being "choked out" by the weeds would swamp the finances of a millionaire. Sow your tree seeds in the nursery row on about one-fourth of an acre where you can give them special cultivation and then transplant them to your timber claim when they are one year old.

What variety of forest tree is the most valuable for western Kansas? I think black locust the very best.

Is osage orange lawful as a timber tree? Yes; when planted in the form of timber and not in a continuous row like a hedge.

What do you think of the black walnut? It has been greatly overestimated; it requires the very richest bottom land to do its best; on ordinary upland it is stunted, slow growth; a valuable tree to plant, however.

Can the cottonwood be depended on? No; it is utterly worthless as a rule.

What do you know of the elm and oak? Our soil does not average hardly enough moisture to support the elm properly; the oak is very slow in starting and remains stunted for years.

How about box-elder? It is a native of this locality, which is in its favor; it does not grow to be a stately forest tree as we would like, yet it is not without merit.

What varieties do you place next after black locust for timber planting? The honey locust and hackberry; these three varieties form a trio which cannot be dug up or burned off by ordinary methods, and will stand more abuse and neglect than any other kinds.

Is the ash a valuable timber tree? It is a native, and as such is the very best we have; it requires rich land to hasten its growth. Our native here along the creek banks is the green ash instead of what is known as white ash.

When do you plant honey locust seed? In the fall.

Will the chestnut succeed here? No; it is more worthless than the oak.

Does the catalpa make a good forest tree? It has some objections.

Would it make good firewood, the same as the ailanthus? No; it makes about one-half as much growth.

What do you know about the hard and soft maples? The hard or sugar maple will not grow at all and should never be planted; the soft maple succeeds fairly well in certain places.

Is the Russian mulberry desirable? Very highly for wind-breaks; it varies greatly in form and foliage and needs more time to define it as a forest tree; one of the very best to stand drouth.

How can we protect our fruit trees against the borers? Prune low so that the tops will shade their own trunks, leaving the lowest limb on the south side of the tree; the high, bare trunk of a tree devoid of side branches is very apt to sun-scald, which makes a favorite spot for the borer to burrow in; the borer cannot work in the shade, but must have the full heat of a noonday sun to get its appetite and blood to circulating rightly, when they delight to infest trees whose vitality has been debilitated by various causes; nineteen-twentieths of all the apple trees set out in the prairie states have succumbed to the ravages of the flat-headed borer.

Will whitewashing prevent the working of the flat-headed borer? I don't think it will, but washing the trunks of the trees with any alkaline substance is good; a mild solution of concentrated lye applied at the end of May and in July and August is excellent.

What are the most successful fruits to grow in western Kansas? First, cherries; second, plums; third, apples. The Missouri Pippin and Winesap come into bearing the soonest of winter varieties.

[We have had the pleasure of visiting Mr. Allen's orchards at Hays City many times during the past five years and his cherry trees were a sight to behold; they were so loaded with fruit that they looked more like a red ball of fire than a fruit tree; last year 3,200 quarts of cherries were marketed, which realized the owner the snug sum of \$320; Mr. Allen also harvested ten bushels of cultivated plums, and about 100 bushels of apples; he refused \$500 for his fruit crop before he began to gather it. This fruit result was obtained only fifty miles northeast of Ness City, in a county no better watered than ours, and we hope to see Ness county do as well when we get as many acres of sod under cultivation as Ellis county has.—Secretary.]

Is this country too dry for the strawberry? Rather dry, but have had fair success.

Will blackberries and grapes flourish? Blackberries will not; the Concord grape does quite well.

How about the apricot? It is some hardier than the peach.

Will the pear do well? It has been grown with some success.

What is the best way to set out and take care of fruit trees? Have the ground deeply and thoroughly prepared; plant a trifle deeper than the tree grew in the nursery; do not hill up but keep the ground level; very much depends on after culture; mulching has many disadvantages—persistent cultivation is much better; dry dust constantly stirred through a long drouth is the best form of mulching that can be given; the reason is simple: the earth is full of minute pores through which the rainfall filters downward; the same pores are also in use on dry days for the moisture to evaporate out of and frequent stirring of the soil fills these little pores so that the moisture is retained in the ground where it is needed to support plant life.

How deeply should land be cultivated about growing crops? Shallow cultivation and plenty of it is the best.

What is the best way to keep gophers from burrowing in under

fruit trees? Plant castor beans occasionally through the orchard and the gophers will leave.

A vote of thanks was tendered Mr. Allen, after which the meeting adjourned.

FRANK MOREY, *Secretary*.

PLANTING AND CULTIVATING EVERGREENS.

BY W. R. HARRIS.

I have no paper; wrote one on this subject two years ago and have not changed much since. I am not growing from seed now, I prefer to buy one-year seedlings. I get them in the spring from some reliable grower, heel them in in the shade and let them stand till the fibrous roots form, and then transplant on a cloudy day. Two-year-old Scotch pine, Arbor Vitæ, and Norway spruce can be grown without shade, but we prefer to shade the one-year plants. Our screen is a frame-work covered with slough grass, and it is handy because the plants can be sprinkled through it. The next spring after growing one season under this shade we transplant to the open field. We put out 2,000 last spring and lost fifty of them.

Run a tree plow under evergreens *every other* year if you intend to transplant them some time; when they get up pretty good size take out every other one to give more room. We "block out" trees eight to ten feet high and have very little loss. Prepare the hole where the tree is to stand; then pour water around the tree and let it freeze; when sufficiently frozen, dig around, leaving a ball of earth attached to the roots; take out the tree with this ball of earth, haul on a "stone boat" to the place you have selected, set it in the hole already prepared, and there is little danger of its dying.

DISCUSSION.

WILLIAMS—What is blocking out? Transplanting large trees? I do this in May, never in the winter, as the labor is easier.

WEBBER—I want to ask about the native pine; is it good? In Custer county the native yellow pine is common; can any one tell if it is like the kind horticulturists disseminate? We want to decide if it is.

MASTERS—I am not aware of the extent of the pine; it is in Keya Paha county; it is preferable to Austrian pine, and is easy to transplant. I have *Pinus Ponderosa* twenty feet high. My evergreens are troubled with an insect that begins the first of September on the tips of last year's leaves; it turns them a light green, then a light brown, and finally they fall off. This attacks *Pinus Flexus* worst of all.

WEBBER—Sargent says there are no pines in Nebraska, but we find he is mistaken; we think the pines in northwest Nebraska were at one time connected with those of southeast, but years of prairie fires have broken the connection. The yellow pine of Arkansas is *Pinus Ponderosa*, and ours is a variety.

EVERGREENS FOR THE PLAINS.

BY C. S. HARRISON.

Having had several years' experience almost under the one hundredth meridian, looking both ways I note some experiences which may be of value to others. Always in a new country people will say "You cannot raise this or that." In 1871 an old settler at Crete said "You never can raise an evergreen in Nebraska," and yet if you know how you can just as well raise an evergreen as a cottonwood. Many of them will endure more neglect, and will live where a cottonwood cannot.

PINES.

Among the pines—yea, among all the evergreens—adapted for the vast country reaching from the Missouri river to the Rockies, I place first and foremost the *Pinus Ponderosa*. It is a native of northwestern Nebraska. It was born and brought up in a land of drouths. It is a hardy, heroic, brave tree, and from it our grandchildren will cut saw-logs all over these vast prairies. It has been sadly neglected, because it was thought so hard to propagate. But years of experience shows it is as easy to handle as the Scotch or American pines. It is a grand tree—symmetrical and imposing with the deepest green; it has heavy plumes; it grows in regions that are very dry, where the ground is seldom soaked. I have allowed it to grow in grass and weeds to

see how much it could endure. It laughs at neglect, and thrives where many a hardy, deciduous tree would fail. Taken from the mountains, and placed under a screen, and carefully handled, about seventy-five per cent will live. After two years of shelter they should go into the nursery for two years—then they are ready for the grove or wind-break. This tree has been prepared and fitted for the great work before it, and it has a mission more than any other, probably in transforming these bleak plains into woodland beauty. In this year of unprecedented drouth, in land dry as this, they have made a growth of a foot. They have the longest needle and the richest color of any pine we can raise.

I would also mention the *Pinus Flexilis*. Some years ago I transplanted some of these trees in the hot, dry soil of Pueblo, and have noted their endurance and hardiness. E. F. Stephens has one growing in his nursery which seems more compact and hardy than the white pines near it. It looks some like the Weymouth, having five needles in the sheath—only the needles are a little shorter. It has an immense cone, and will make an agreeable addition to our conifers.

The Scotch pine, while young, does remarkably well. I have thousands raised from the seed that are now two and three feet high. In the east they are, without exception, the ugliest evergreen that grows, but I have some very fine and compact and symmetrical specimens. A few years ago we had a terrible hail storm, and it did not seem that a single tree could survive, they were pounded out of all shape, and yet, strange to relate, hardly one died, and they are more beautiful to-day for that awful storm. They formed new buds, and threw out a mass of branches as if to protect themselves from any future assaults of like nature. Last year they made a growth of twenty to twenty-five inches, and this year from twelve to eighteen inches. Yet I fear for them when they get age. I note some on a high elevation near Riverton that have made a heroic struggle all these years, but now they must die or be crippled.

The Austrian pine does well. It is not as thrifty as the Scotch, but I think it will prove comparatively short-lived in the west. Eastern trees have always lived in the enjoyment of wet feet, and it is doubtful if they will live long without it.

My opinion is, you might gather together all the pines you can hear of, and plant them 200 miles west of the Missouri river, and the Pon-

derosa in its babyhood will attend their funeral, and then go on to a noble old age.

We have, then, four pines which, for a time at least, will do well on the plains, and if ever the conditions change—giving us a moderate rainfall—they will be a success.

SPRUCES.

Of the spruce never plant on the plains the white, the black, or the Norway. It is no use. The winter drouth will kill them. But there are spruces which for thousands of years have endured the dry weather and the hot suns and dry air, and they are not affected by these conditions.

The Douglas spruce is the tree for the millions. In the eastern nurseries I noticed it made the most vigorous growth of any of the conifers. Its habitat reaches from the eastern slope of the Rockies to the Pacific coast. Our chief of forestry says that nowhere on the face of the earth is there so much lumber to the acre as this produces. This spring I tried the experiment of planting trees from two to three feet, strong and stocky, such as grow in open spaces. I planted quite a quantity of that size in the open ground at Beulah and Pueblo and also some under the screen at Franklin. Ninety per cent lived and grew as thrifty as Norways of the same size from the nursery. Of late years we have had severe May frosts which have injured the tender shoots, yet for all that they have made a fine growth. The foliage is soft and the tree has almost endless variations. Some rigid like the *Pungens*, some pendulous, some of light soft green, and some of deep blue with silver tints. It is easy in selecting trees especially in the higher altitudes to secure the richer colors. Temple and Beard, of Cambridge, Mass., secured 500 last spring of the finest sheen for their eastern market. This tree handles easily. There is but a small per cent of loss, and as trees of large size can be secured, there is a great saving of time. It is somewhat difficult to raise plants from seed when the weather is too hot.

The *Picea Pungens* is one of the hardiest of trees, growing well in Washington, D. C., and even in North Carolina. It is adapted to a wide range of soil and climate and is a great favorite for lawn and cemeteries. Its sheen is of marvelous beauty while it is young, but it does not retain its beauty like *Concolor*. The *Picea Englemanii* is

often confounded with this and is often sold for it. A prominent dealer in Denver has been known to fill an order of several hundred fine silver Pungens with the Engleman and only one Pungens in the lot. However, the Engleman is a fine tree, usually well tinted, hardy, and transplants well. There are two types, the common and the gigantic. The cones are small and it takes about 200,000 seeds to the pound.

I notice on the grounds of Mr. Stephens of this place some spruce which I think are the *Alcoquinnia*, from Japan, which appear to do well.

I would not fail to mention the Black Hills spruce, which certainly gives great promise. In northwestern Iowa they take the preference of all other evergreens and they certainly behave well and promise well in Nebraska.

FIRS.

For firs, I think that the *Abies Concolor* stands first. This is a hardy tree of peerless beauty, and if asked what is the finest tree in the Rockies, taken all in all, I would say the *Concolor*. You often find it nearly as bright as the Pungens, and then it retains its silvery brightness till it dies, when the Pungens will, to a large extent, lose its exquisite charms after it is twenty-five or thirty years old. There is nowhere such richness of color as in a grove of *Concolors*. Take them in the spring, when they are developing their cones. They are clothed in silver and emerald. The new growth is light, soft green, contrasting with the richer color of the older foliage. One tree will have blossoms, buds, and cones of deep purple; another by the side of it will have those of bright green. The cones are upright and massed upon the top of the tree. From these a clear gum exudes, clear as crystal. Then when the light and the breeze play upon them, you have the mingling of the silver with the various shades of green, from the light and soft almost to the blue; then the deep purple and the sparkle of the gum from the cones like the flashing of diamonds.

RAISING CONIFERS FROM SEED.

If Job, living on the outskirts of the great Arabian desert, had tried year after year to fight the hot winds and raise evergreens in the very teeth of the sirocco, he would have added much to his reputation for patience, to say nothing of his skill.

It is a hard task to raise plants from seed under the one hundredth meridian, the fatal line almost for horticulture. It is trying to see the plants come up covering the ground with greenness and then see them go down in platoons before the hot blasts. You may make your screens perfect, yet the breath of a 112° blast is too much for them, unless extra precaution is taken. Some years are much more favorable for this work than others; in an ordinary year there seems but little trouble. I have often had excellent stands of plants, but this year has been disheartening. It is a melancholy thing to attend the funeral of a half million of bright promising plants as ever crowded their way into an unfriendly world. Yet it has not been all a failure. I have developed some things which I might keep to myself and defy you to find out. But we all have a mighty work to do to clothe these fair prairies with greenness and beauty.

Mother Nature is an excellent horticulturist, and her teachings are not to be despised. She succeeds in raising trees where it seems impossible for them to grow. Take the Ponderosa, so sensitive to the damps that it will die by the thousand if you do not work just right, and yet they grow in the hot, dry foot-hills. Why do they not damp off there? See how Nature does it; she lets the seed fall among the needles and down into the leaf mould. What makes the tiny plant die? It is the action of the hot air or sun just where the delicate stem comes out of the ground. The top is all right. Death always attacks the base. Nature always defends this and never allows it to be exposed to the sun or currents of hot air, and you are to follow her example. I thought I could defeat the disaster by darkening the whole bed, but I found the currents of hot air could see in the dark, and I looked under the heavy screen and the plants were dead—all gone. Some beds I covered with moss, but the common moss of Wisconsin settles down as you water the bed and leaves the stem unprotected. One bed I covered with mountain moss, which does not pack and lets the plant grow up through it, and there I succeeded. Another I covered with the trimmings of some Pungens, that acted in the same way. I think now I can say eureka, and even in the region of drouth and hot winds conifers can be raised to advantage, and yet I query whether we had not better raise our plants in the mountains; but then they are already raised there and are ready for shipment, only the plants must be secured from gravelly locations, where you are sure of

fibrous roots; and this leads me to speak of the proper way to handle young trees, either from the seed bed, the nursery, or from the mountains.

THE CARE OF YOUNG PLANTS.

When a small evergreen is dry it should be taken up with the spade to secure all the fine fibrous roots. If the ground is too rocky for this, as it is in nine cases out of ten, let the plants alone and go until you find the right place. As soon as you dig the tree, plant it again. Have a puddle of thick mud ready and dip it into this and seal the roots up air tight. Put in bundles of twenty-five. Then you can heel them in with safety. If, however, you heel in before this, you stand a chance to lose your tree in twenty-four hours or less, for the evaporation is going on all the time and the air is creeping in at the roots. Then when you pack dip in mud again and pack in moss. It is better to trim off some of the lower limbs to prevent heating, as, do the best you may, there will be more root than top. T. C. Thurlow, of Massachusetts, clips off all the side branches and perhaps a part of the top and has good success. Some growers east—Manning, of Reading, and Thurlow—plant their mountain trees in the open air without protection and then save seventy-five per cent. Such a course would be fatal in the west. We are to remember that the climate and conditions are entirely different. There a man deserts a farm and Nature plants it to pine, cedar, and hemlock, and in forty years saw-logs are cut from it. Nothing of this kind happens on our western plains. A heavy screen is absolutely necessary—a screen which will shut out half the light. Of course, under the screen the trees will not dry out as in the open ground. In an experience of several years I have not had to water, only when the trees were planted, until this year. You want a screen near your windmill, where you can irrigate when necessary. I have now a half acre under cover, and have some 200,000 plants; perhaps these must be watered often.

Never try to raise seedlings without watering from the time the seeds begin to sprout. They must not be permitted to become dry till they come up.

CEDARS.

For cedars, we have the red cedar of the Platte, a native of great vigor and hardiness, toughened and bronzed by hot wind and blizzard. This does well, and under good cultivation makes a good

growth. It rather merits the name of everbrown rather than evergreen. However, by planting in groves, when the trees get age, they keep fresher than when single.

The silver cedar of the Rockies, with its exquisite foliage, is just as hardy, just as thrifty as the native born. Some of them will brown a little in winter, but even the brown is mingled with silver, giving a very unique appearance.

The Arbor Vitæ is a very uncertain affair on the plains; the only thing you can really depend on is its dying sooner or later. But for three years I have been testing the Chinese Arbor Vitæ, and so far I am well pleased with it. It is called tender in Massachusetts, and so is the hardy catalpa there, where they raise tender peaches. Douglas says it does well in the hot winds of Kansas, and from what I have seen of it I have faith in it.

The brown cedar of Colorado grows in the driest part of the continent, along with the bush cactus. It is a heavy wood, about as heavy as the oak. It has a very pungent odor and is often used for fuel by the Mexicans. I have sometimes transplanted it successfully. It is somewhat unique in appearance, with a light green foliage. It is not durable as the red cedar, but it will certainly endure the drouths of this state. It grows on dry knolls among rotten shale rock in the foot-hills. We often see specimens a foot through which must be hundreds of years old. The rings are often too fine to be counted and the tree will barely exist year after year. Transplanted and well cultivated it makes a fair growth and it should not be omitted in our collection.

DISCUSSION.

BROWN—I would like to ask how to transplant evergreens?

HARRISON—As soon as they are dug, dip the roots in soft mud; then heel them out until you are ready to plant. Always puddle, for there is no other successful method.

BROWN—Last year we planted 500 and have now only fifty of them; this spring we planted 1,000 and have but a very few.

HARRISON—Put them down deep; stamp them in hard; don't be afraid of pressing them into the ground too solid. Plant deep and all will be well.

CARPENTER—I don't think the *Pinus Ponderosa* is as good a tree

as the Scotch pine; would place the *Picea Pungens* next to the Scotch pine. The *Pungens* is a very beautiful tree. On Thomas Meehan's grounds, in Philadelphia, is a large *Picea Pungens*, the most beautiful tree in the world. The silver cedar is one of the coming evergreens; it does not "brown" like the common cedar. Several years ago, I pulled some *Picea Pungens* on slopes of Pike's Peak, planted them, and they did very well.

HARRISON — In regard to the sheen of the *Picea Pungens*, go to the Rocky mountains and see for yourself. Will Brother Carpenter take 1,000 Scotch pine and let me take 1,000 *Ponderosa*, plant them, and see who saves the most plants?

BROWN — Has Mr. Harrison seen the Black Hills spruce?

HARRISON — No, I have not in the open; we must get our evergreens from the west if we would succeed.

CARPENTER — I must take issue against Harrison in regard to the white spruce; I consider it a good tree. The Black Hills spruce is merely the white spruce from the Rockies.

ORNAMENTAL TREES.

BY A. F. ROSENBERGER.

Ornamental tree planting is a subject we seldom hear discussed, though of quite as much importance as any question presented to us. What is more attractive to the eye than a group of evergreens?

Many persons admit that evergreens rank at the head of ornamental trees, but say they cannot grow them successfully. To such we would say: Plant your evergreens in groups, mulch well, and you will have no trouble in starting them. We find the American *Arbor Vitæ*, Scotch pine, white pine, Norway spruce, and balsam fir are all evergreens that thrive in our state, though there is another tree that stands at the head of the list of evergreens, the Colorado blue spruce (*Picea Pungens*). I sincerely believe the *Picea Pungens* to be the finest evergreen on earth. It is perfectly hardy, a strong grower, easily transplanted, and of most magnificent form and foliage. Its beautiful dark green foliage during the winter months make it very attractive, and if

you want one of the finest evergreens, I would say plant the blue spruce.

There is another ornamental tree that should have a place in every park in the land, the Russian olive. This tree has most friends where it is best known as the perfume from the early spring flowers fills the air with fragrance for miles around. One lone tree will perfume the air for more than a mile around it. It has beautiful silver foliage which adds much to its desirable qualities. It is a tree of remarkable hardiness, easily transplanted, and a rapid grower.

The catalpas, cut-leaf weeping birch, white birch, mountain ash, the elm, and lindens are all of our best ornamental trees.

The European larch has been discussed more by the Society than probably any other ornamental tree; while we have but little knowledge of it we are well pleased with the results of our planting.

The Judas tree, one of our common ornamental trees, should have a place in every plantation, as its early spring flowers make it very ornamental indeed. It is hardy and easily transplanted.

We also have many other native trees that are very ornamental and would give good results if we would give them more of our attention.

LAWNS AND PARKS.

BY PROF. L. E. HICKS.

For most of the people of a new country the useful has a stronger claim than the beautiful. It secures attention first and commands the most intense effort of the greatest number. We must simply accept this unmistakable fact as we do other established facts.

I have no quarrel with it, not only because it is a waste of time to quarrel with facts, but because this particular fact has sound reason on its side. We all have to solve first the problem of living at all before we can consider how we may live in the midst of tasteful and elegant surroundings. We must have regard to utility rather than beauty, so long as we are engaged in a keen struggle for existence. But that struggle is happily ended for some of the people in Nebraska, and there is danger of the habit of ignoring the beautiful, of starving the esthetic faculties in the process of making sure that the body shall not starve,

a habit firmly fixed at first by a stern necessity may persist after the necessity has ceased. We are in danger of neglecting the beautiful after we have become well able to cultivate it. More tasteful homes are, however, beginning to appear on Nebraska soil, and I think the time has come to institute a reform in the matter of more tasteful surroundings, in the shape of pretty yards, green lawns, and fine parks to correspond to the improved style of houses. We are not yet so much crowded with a dense population but that every man may have some bit of land at his door which he may convert to the service of the beautiful ; or leave in that state of slovenly neglect which proclaims his lack of taste and refinement ; nor yet so crowded as to prevent each city or town from having public parks and gardens. The wealth to create these is not the only thing needed. In fact there is in many places ample wealth to produce fine effects in landscape art, but these do not appear because people do not appreciate or understand them.

The greatest obstacle to the progress of landscape art in the west is the lack of desire and appreciation of these things—not the lack of wealth to produce them. We must have not only money to produce beautiful examples of landscape art, but an educated public sentiment such that money expended on these things will not be regarded as money wasted. It is the natural and legitimate province of this Society to aid in forming such a public sentiment, and stimulating the general appreciation of the beautiful. The cultivation of ornamental shrubbery—the most essential feature of park adornment—is one of the legitimate objects of this Society, and by no means the least important, or least worthy of its attention. The production of beautiful landscape effects is one of the branches of fine arts. Like many other of the higher and more refined products of the human mind, it has much to struggle against before it gains recognition and only attains its highest development in the midst of an advanced civilization. It is true that some attention was given to it among the ancients whose civilization was not of the highest type, but these early efforts were chiefly in the mathematical style. For in landscape art there are two distinct schools which are essentially different in general aim and detailed treatment, besides those smaller individual differences which result from the genius or lack of genius in the engineer in charge of the work. These schools may be broadly designated as the mathematical and the natural.

A landscape engineer of the mathematical school produces beautiful effects by a skillful combination of geometrical figures, such as the circle, the ellipse, the crescent, the triangle, the square, the star, the polygon. He uses freely either straight lines or curved lines, and by means of stone walls, parapets, paved terraces, and esplanades his work shades into and harmonizes with structures which are strictly architectural. In the natural school straight lines are avoided, the existing contours of the surface are followed as closely as possible, the grouping of shrubs, trees, greensward, flowers, steep banks, gentle slopes and level spaces is so contrived as to seem only a heightening of the natural beauty of the scene.

Each school has its merits; if the one is better here the other may be better there; and it is often possible to combine the principles of the two schools with the happiest effect. The mathematical style of treatment is more appropriate for lawns, for the grounds about public buildings (unless they are very extensive), for grass plots in the streets, and, in general, for spaces of small extent, in close proximity to buildings with which the outdoor ornamentations must harmonize; while the natural style is appropriate for extensive parks having a diversified surface, which controls the artistic treatment by suggesting lines of beauty already latent in the ground, and needing only the keen eye and skillful touch of a master of landscape art to bring them out.

The mathematical style is apt to be frigid and artificial unless it is confined strictly to those cases in which the limited space to be adorned, the monotony of the surface, or the proximity of buildings renders it impossible to use any other style with pleasing effect. The unpleasant and inartistic development of mathematical lines is seen in its most exaggerated form when one figure is repeated over and over, as, for example, the repetition of the square in the usual method of laying out cities and towns and in land surveys. The national government has covered the whole country with a checkerwork of straight lines and right angles, thus doing all in its power to mar and obscure its natural beauty. In this prairie country very little was needed to convert whole counties into the verisimilitude of a magnificent park if the graceful curves of nature had been followed. If the roads had been left to follow the line of least resistance they would have been at once cheaper, better, and more beautiful. The rectang-

ular system of roads and streets is the most formidable enemy which landscape art has to contend with.

We have in Nebraska very few examples of landscape art, either of the mathematical or the natural style, which may be cited in illustration of this paper. In the absence of better and more numerous illustrations permit me to cite, as a single example of the mathematical style, the ornamentation of the capitol grounds, and, as an illustration of the natural style, Grandview Residence park. (Plans exhibited and analyzed.)

I have said nothing of the kind of plantings required in park management. That is a branch of practical horticulture which I leave to be discussed by abler pens than mine. I shall be content if I have contributed anything to the formation of a sentiment of appreciation of the beautiful, and given some hints as to the style of treatment which is most appropriate in the different situations encountered in the practice of landscape art.

For the average householder who has neither the land to lay out a large lawn or park, nor the money to spend in laying it out and maintaining it in good order, there still remains the door yard to be beautified. Much may be done in that, however small the space it includes. A few yards of well set turf, a few shrubs, not in stiff straight lines, but in graceful groups, a few flowers, a climbing vine—how much of heart and home happiness is suggested by the mere mention of these few and inexpensive adornments!

Let us all cultivate the beautiful ourselves and teach the appreciation of it to others, so that the feverish struggle for wealth may be tempered by more rational enjoyments.

PALMS.

BY W. J. HESSER.

Officers and Members of the Nebraska State Horticultural Society:
There is no class of plants that I have a greater love for than palms. Many times a day I go to the greenhouse to look over and admire them. There is something in their appearance that is very fascinating

to me, and could I express my feelings with the pencil this paper would need more space than you could give it.

Palms are the most majestic class of plants known. Many of them very graceful, all of them very ornamental. Their number is something extraordinary, both as to species and individuals. Some have stems a little thicker than a straw and a few feet in height, while others tower up a hundred and a hundred and fifty feet in height.

Palms are of great importance in an economical point of view. From them are obtained most of the necessities of life of most of the aboriginal tribes of the tropics, in the shape of fruit, oil, wax, sugar, sago, and fiber for coarse cloth, brushes, mats, etc. The canes, called rattans, are largely used in the manufacture of chairs, stools, seats, baskets, brushes, etc. One species, *Borassus Flabelliformis*, is said to form the chief support of over 6,000,000 human beings. In its native country, Asia, it attains a height of eighty feet or more. A native poem, in describing its useful properties, records nearly a thousand uses to which its products may be applied. The products of the date palm form the chief support of the desert tribes of Arabia, Palestine, Egypt, and northern Africa and Asia, not only of man but their domestic animals. The wood is used in the construction of the frame-work of their houses, and the leaves for thatching.

Volumes could be written in describing the many hundred varieties of palms and their uses. But with us they are only grown for their ornamental and decorative qualities. Many of them are very easy of cultivation as window plants. All do well in greenhouses or conservatories. Large plants require the accommodation of a conservatory. No plant can surpass them for decorative purposes. They are fast coming into use in sub-tropical gardening during summer, where, partially shaded and well cared for, they make a great effect.

All palms need an abundance of water. The pots or boxes should be well supplied with drainage to keep the soil from becoming sour. The foliage should be sprayed often, care being taken that the strong rays of the sun does not strike the foliage while the water is on it, as there is danger of burning the foliage and greatly injuring the looks of the plant. When leaves get dusty, wipe off with moist sponge. No plant can thrive with its foliage covered with dust. That old saying, "Cleanliness is next to godliness," will apply to plants as well as human beings.

I will give a list and short description of some of the varieties of palms I have in cultivation.

ARECA.

A genus of elegant pinnate-leaved palms, widely distributed over the earth, some being found in the East Indies, others in the west, also in the island of Madagascar, in New Zealand, and in Australia. These plants, with their plume like leaves, are highly ornamental for the dinner table, for room and sub-tropical gardening.

Areca Amercanthus—A strong growing variety; reddish brown foliage.

A. Alba—An exceeding handsome species from Mauritius.

A. Baueri—An excellent decorative palm, with pinnate leaves four to six feet in length; a good grower.

A. Lutescens—An elegant palm, with pinnate, arching leaves; the stem and sheathing petioles are perfectly smooth. Yellow in color, mottled with black; does best in a shaded place; native of the Mascareen islands; one of the best of its class.

A. Rubra.—From Mauritius; reddish pinnate leaves; very ornamental, but rather tender.

A. Verschaffeltii—Similar to above.

Acanthopœnix Criniata—The leaves are pinnate and beautifully arched; the petioles sheathing at base, and profusely armed with long, sharp, black spines; tender; native of the Mascareen islands.

CHAMEROPS.

A small genus of palms. All of which are very hardy and succeed well in greenhouse or as window plants, or for sub-tropical gardening, the various species being found through northern Asia, northern Africa, the south of Europe, and southern United States.

C. Excelsia—Leaves fan-shaped, deeply split down into narrow segments, which stand erect, and are dark green in color; native of the East Indies; should be in every collection.

C. Humilis—An exceedingly handsome palm; very hardy; native of southern Europe.

C. Canariesis—A handsome fan-leaved palm; from the Canary islands.

C. Hysterix—A most excellent palm; native of Florida and lower Georgia; leaf green above and silver gray beneath; the base of petioles are armed with long, brown, sharp-pointed spines.

COREPHA.

C. Australis—A very hardy Australian palm; the foliage green. The fan-like leaves are deeply split; it has stout, dark brown petioles enclosed in a network of fibrous matter at the base, and armed at the edges with sharp spines; a very desirable palm for decorative purposes,

COCOS.

All the Cocos are majestic palms, with pinnate leaves very graceful in form; fine greenhouse plants.

C. Australis—The hardiest of the species; leaves pinnate, long, and slender, on large plants ten to fifteen feet long; hardy in Florida and Louisiana. On a lawn in New Orleans, La., I saw one with stem fifteen to twenty feet high, with its spreading pinnate leaves it made a sight that would do any lover of plants good to gaze at its majestic form.

C. Wenddeliana—From South America. One of the most elegant palms in cultivation. The leaves are from one to four feet in length, and beautifully arched. The pinnate leaves are long, narrow, and pendant, dark green on upper side, glaucous underneath. The stem is slender, clothed with a black netted fiber. In a small state are unsurpassed for table decoration. No collection should be without this graceful palm.

C. Nucifera—The well known cocoanut palm; grows very large, being found in nearly all of the tropics; very difficult plant to grow in pot.

BRAHEA FILAMENTOSA, OR FILAFERA.

A beautiful palm from southern California. The immense fan-like leaves are covered with long filaments; a fine decorative palm.

B. Robusta, or *Washingtonia Robusta*—Similar to above, only more robust in growth. Very desirable variety.

Latania Borbonica—From southern China; one of the most popular palms in cultivation. For decorative work it stands well and will bear a low temperature; is one of the hardiest fan palms; the palm-leaf fans of commerce are made from the leaves of this variety. Should be grown in partial shade while young.

Seforthia Elegans—Native of the northern parts of Australia; sometimes called the Australian feather palm; leaves pinnate, from

two to ten feet in length ; fine for decorative work in hall-ways, windows, or sub-tropical gardening ; requires a shaded situation.

Raphus Flableformus — Native of China and Japan. This beautiful palm is highly recommended for decorative purposes, or as a room or window ornament. The stems are slender, leaves flabellate, upon short foot-stalks ; are of a dark green color. Walking canes are made from the stems of this variety. It produces suckers freely from bottom and soon makes a large clump. This palm has but few superiors as a decorative plant.

KENTIA.

A genus of palms that have pinnate leaves, which with the stem are quite smooth. The Kentias are all very hardy and splendid for decorating rooms, windows or hall-ways, as well as for the greenhouse. The leaves are thick and tough and very tenacious. A class of palms that is easy to cultivate and that is fast coming into general use, though at present is somewhat scarce and high in price.

K. Australus — Very handsome, compact growing palm ; leaves light green in color.

K. Belmoreana — A beautiful, graceful species, from Lord Howe's island ; when mature, reaching a height of forty to fifty feet.

K. Canterburyana — Truly a handsome variety ; its native name being the Umbrella palm ; leaves rich bright green in color ; native of Lord Howe's island.

K. Fosterana — Sometimes called Thatch palm ; a robust growing species from Lord Howe's island ; attaining a height of forty to fifty feet ; its leaves are very deep green in color ; a fine decorative palm.

K. MacArthurii — Bright green foliage ; a very desirable species ; from Lord Howe's island.

PHŒNIX.

All the Phœnix are highly recommended for decorative purposes, and quite hardy and easy to cultivate ; will bear a low temperature ; the leaves are all pinnate.

P. Dactifera — The well known date palm ; it has long dark green pinnate leaves ; native of northern Africa and tropical Asia ; fine for apartment decoration.

P. Reclinata — An elegant large growing species, from south Africa ; an excellent palm for decorating hall-ways and other room decorations.

P. Sylvestris—The most beautiful species of the whole genus ; a strong and rapid grower ; will endure a low temperature ; invaluable for apartment decoration or for out-door decoration during summer ; native of Bengal, where it attains the height of forty or more feet. The sap is used for making sugar. One plant is said to produce eight pounds annually.

Ptychosperma Alexandra—This is an elegant species ; somewhat rare ; leaves pinnate ; light green in color ; native of Australia.

Sabal Adansonii—A dwarf-growing palm, from the southern states. The leaves are used for fans, hats, etc. Hardy and ornamental.

Sabal Palmato—The well-known palmato tree of the south ; leaves large, fan-shaped ; valuable as a decorative palm.

Oreodoxia Regia, or Royal palm — Of West Indies and south Florida ; a graceful, slender growing, pinnate-leaved palm ; very valuable for apartment decoration while young ; a grand conservatory plant, when well grown.

Thrinax Argentia — An elegant fan-leaf palm, from the West Indies and south Florida ; leaves shining green above, bright silver beneath.

Thrinax Parviflora—Royal Palmato palm, from the West Indies ; leaves palmate, divided about half way down into narrow segments ; dark green on both sides.

Cycas Revoluta — Sometimes called Sago palm. This is one of the most beautiful decorative plants I know ; one that is so easy to cultivate and always beautiful ; they usually make but one growth a year ; all the leaves of the season come out at the same time. They should be handled very carefully until the leaves get fully matured, then they will bear as much neglect as most any plant I know. Can be kept in a dark room for days without any perceptible harm. They are always ornamental and admired by every one that sees them ; leaves glossy dark green ; densely pinnated ; very hardy. Excellent for apartment decoration or for greenhouses, or for sub-tropical gardening in summer.

In making out this list I have aimed to use the names most commonly used, though most of them are catalogued under three or four or more different names. And some of the names used herein may not be the proper ones, yet they are the names I find most generally in use by good growers. Where I speak of plants that will bear neglect, I do not recommend it ; all plants should have good care, and any person who truly loves good plants is not apt to neglect them.

EVOLUTION IN HORTICULTURE.

BY PROF. CHARLES E. BESSEY.

There is no money in this talk of mine, but I trust that there may be some suggestions of value to the horticulturists. And by horticulturist I mean not the man who is in horticulture for money alone, but who has a love for the study.

The horticulturist is an evolutionist, continually bringing about an evolution, bringing about great changes to suit his own tastes; not content with nature, he insists in modifying her to suit his requirements. In his hand a plant is pliant as wax. Now this phase of the work, this taking plants and changing them, is what I want to talk about to-day. While you are growing fruit for profit you are each contributing to this evolution, which is continually progressing.

I have picked out a few of the prominent fruits on which to base our talk to-day, and in which such vast changes have been made by the horticulturist.

Away back thousands of years, this apple we now admire and eat, or rather its ancestor, was a crab-like fruit, sour, bitter, and hard, scarcely fit to be eaten. There are still growing wild crab fruits, of which this is a good example. Europe is the home of the wild apple and it has been used there for thousands of years; when man first set his teeth in the apple no one knows.

In clearing away the debris covering the lake dwellers' inhabitations many remnants are being discovered; they are finding remnants of all sorts of things, and among these, remnants of apples; I don't know how they could remain so long in a recognizable form, but they do.

These Swiss lake dwellers occupied these inhabitations a number of thousand years ago, but the remnants show that they had a small variety of apple, about three-fourths to one and one-fourth inches long by one and one-fourth to one and one-half inches in diameter across. The English wild apple is about this size, of poor taste and very little to attract the eye or the palate; hard, late, acerb, green; tree small and ill-shaped. Now we have a hundred, a thousand.

MEMBER — Thirty-six hundred now, Professor.

PROF. BESSEY — Yes, three thousand six hundred varieties of our delicious apples.

A great evolution has been brought about since the time of the Swiss lake dwellers. Great changes have been made. From the sour thing we have the sweet; from this small, green thing we have our large, red, striped, and golden apples. This is duplicated in the case of many other fruits.

The pear, originally small, has not been modified so much as the apple. Yet it has undergone great changes from the small, sour, spotted fruit of olden times to the present large delicious fruit.

The peach comes from China, not from Persia, as many suppose. Its early history is lost, but it is similar to that of the apple no doubt.

The thick fleshed peach of to-day is far removed from the original fruit with its large pit and very thin meat, scarcely more than a skin.

Plums have a different history: In the old world there are two species which have undergone great modifications, but these have been enriched by the addition of three American species, which have also undergone much change.

The cherry comes from two old world species. Although we have several species native of America our horticulturists have not attempted to cultivate any of them, but seem content with those of the old world. One of our wild cherries is very much the European varieties.

Our grapes, unlike most other fruits, are not from the old world, but are evolved from our own native wild grapes. The old world grape has been grown so long that we cannot tell much about its former history. It is possible there is some old world grape blood in one species of ours, the *Æstivalis*. You can find wild grapes growing in many parts of America that are nearly as large as the cultivated one. The horticulturist here has a grand field before him to improve these wild varieties.

Gooseberries are mostly of the old world kind. We have wild ones in this country, but they have not been cultivated and improved to any great extent.

The currant grows wild in the old world, as it also does here, but we have used the foreign species for cultivation and neglected our own. We have fine black and red wild currants that merit cultivation.

The blackberry is purely a new world plant and its great modifications have been brought about in the last 200 years.

It is nearly the same with the raspberry.

The strawberry has not undergone much change, although Europeans have hybrids that are better than the varieties we have.

I have one or two thoughts I wish to present as the outcome of this talk and they are :

First — We can bring about great changes in horticulture by improving and cultivating our native wild fruits, many of which are very promising but are neglected because we have cultivated varieties that supplant them.

Second—It does not take so very much time to bring about these changes, as we can see in the case of the blackberry.

Third—It is good to hold on to all we have of old world goods but we should try to improve our own now.

In conclusion, I would say that every horticulturist is an evolutionist, and as such he should do all in his power to bring about those changes for the better to which all our fruits are susceptible.

DISCUSSION.

CREIGHTON — That old theory of “natural selection and survival of the fittest” is almost exploded ; of course I think fruits have been improved by *artificial* selection and that this old orthodox theory will be modified. There is no evidence to show that any plant ever changes beyond certain limits, and the natural tendency is to retrograde.

HARRISON — This is a pretty broad subject and requires much thought. Our American crab apple is a good example of what the first apples were. I never can forgive a boy who traded me a dozen of the little, sour things for one good apple ; they did not look so very bad and a dozen for one was big odds, but when I bit into one I knew why he wanted to trade. I have seen at Harvard specimens of the original apples from Pekin about as big as a currant and from that up to the size of a cherry. Evolution has some wide gaps in it, but, after all, there is something in it for our benefit. In regard to cherries, you find in the Rocky mountains a tree that bears fruit very similar to the English Morello.

BESSEY — I didn't think “evolution” would be a “red rag” or I should have searched a long time for a better term. I can't think of one now. I was not using it to bring up a scientific discussion, but to show that the horticulturist by judicious selection could produce

great changes. By taking small things man has produced fine fruits; by taking wild things and bringing up and making something useful out of them. This is what I mean by evolution and I can't think of a better term now.

CARPENTER—This term "evolution" is all right. Take the dahlia for example. Originally it was a small plant with a small yellow flower. Look at them now; large, strong growing plants fully four feet high with flowers of almost every color. No one can deny that there has been an evolution in this case. And this did not take over fifty years either. Fifty years ago we had two or three varieties of strawberries; to-day we have several hundred, larger berries, more productive and generally better flavored. The bees have helped some in bringing about these changes, too. We should plant crab seed fertilized by apple, and try to produce still better varieties. What we want now is an apple with flavor of the Northern Spy and hardiness of the crab.

CREIGHTON—What I want is the truth. There has been too much wholesale guessing done by learned men; they *guess* such and such is the case and then tell it for a fact beyond dispute; I don't like that kind of business, nor I don't like to have the Professor talk of "red rags" just as if I were some wild animal to take offense at such things. There is no evidence that apples came from crabs; I don't believe they did. I believe in survival of the fittest by artificial selection, but not otherwise. Bull fruited 20,000 grapes and found but one that was good enough to disseminate. We have established a bound beyond which our fruits never go. I have fruited seedlings of the Bellflower and Baldwin apples and in every case the fruit was inferior to that of the parent; my experience is the same with the Bartlett pear.

BESSEY—I must insist that I have not used the term natural selection.

CREIGHTON—Then I withdraw my objections.

BESSEY—And I withdraw the "red rag."

HARTLEY—Bessey never meant natural selection, but I am glad the mistake occurred, as it has afforded us much instruction and amusement. [Laughter.]

HOW SHALL WE FIGHT CODLING MOTHS?

BY E. F. STEPHENS.

Our customers have been complaining for several years about wormy apples, and there was an increasing proportion of wormy apples in our orchard. Various remedies have been suggested for contending with the codling moth, such as hay bands, trapping them in various ways with vinegar, sweetened water or something of that character, but the weight of evidence now seems to be in favor of spraying with arsenical poisons, for which perhaps London purple is better as it is easier to keep it in suspension in the liquid. After carefully noticing the results of other parties, we sent for an Orchard King two-horse pump throwing two sprays, and also one Perfection pump for use by hand where a wagon could not be driven. For the two-horse pump we use a tank of about 200 gallons. On the top of this tank the pump is placed and operated by gearing from the wheel. Two or three horses running this at a fast walk will spray about 3,000 trees a day. This pump has two nozzles, throws two strong streams, and by attaching the cyclone nozzle it is divided into a fine stream and thrown with considerable force into the trees. We find it advantageous to drive each side of the trees, and this year have sprayed five times. Sometimes after spraying a heavy rain comes up and washes off most of the liquid, and then we have to spray again. For large orchards, we would advise using the two-horse pump, because it is applied very rapidly in this way and a great deal of labor is saved. For smaller orchards a smaller pump costing \$6 or \$7 will be amply sufficient, which should be fastened on top of a kerosene barrel and operated by hand. The time for the spraying with London purple is governed by the condition of the fruit. We commence soon after the petals have fallen off, and continue until after the apple begins to tumble down from its own weight. The object to be gained is to deposit a little of this spray poison in the blow of each apple, which is the place where the moth deposits its eggs at this season of the year. Then after the larvæ hatches out and begins to feed, it is likely to eat a little of the poison and be destroyed. We think it advisable not to use too much of the

poison, as we injured the foliage of some of our trees the first time by using the liquid too strong. In mixing it we got it too strong or were not sufficiently careful. We finally settled down to using one pound of London purple to a large tankful, which would usually be between 150 and 200 gallons. It is not necessary that the liquid be very strong but that a drop of it should be applied to the blossom end of each apple. We purchased our London purple at wholesale through the favor of our druggist, \$12 for a 100 pound keg. We used about fifty pounds in spraying about 4,000 trees. Thus you will see that the expense for poison and the time for applying it is a very small item where the two-horse pump is used. One man drives and the other directs the nozzles. We understand that our neighbor, Mr. Fisk, for whom we procured a smaller hand pump, is very much pleased with the results obtained and that he can very rarely find any wormy apples on his trees.

DISCUSSION.

FISK—I use one pound of London purple to forty-five gallons of water; have noticed no bad results from its use. I get the best results when the trees are in full bloom; sprayed only three times and there is not one wormy apple to every hundred. Beginning at the time when the trees are in full bloom, I would advise spraying every week or ten days until the danger is past.

MILLER—Is there any danger of its poisoning bees or the honey they will make?

FISK—The bees did not seem to suffer from it and I heard of no bad results anywhere in this direction. The spraying killed all the tent caterpillars, however, and did much good that way.

DAY—I think it saves the foliage as well as the fruit.

MILLER—I would like to inquire if anyone has had any experience in fighting the strawberry leaf-roller?

REED—I don't know how to fight them, but we are troubled by them very much in our neighborhood; they have ruined all the strawberry plantations down our way for the past three years.

A MEMBER—You should try burning the plants.

MILLER—I have tried that and it killed the plants.

CARPENTER—Wait till a rain is coming on and then put dry straw over the vines and set fire to it; this will burn the leaves and the rain will prevent further damage.

REPORT OF THE ENTOMOLOGIST.

LAWRENCE BRUNER.

The present paper for your annual report for 1890 is composed of several miscellaneous articles, notes, and an address prepared since your last report was printed. The figures illustrating the insects treated were, for the most part, obtained from the works of Riley, and are credited to the proper sources in connection with the explanation of each.

A TALK ABOUT INSECTS FOR FARMERS' INSTITUTES.

Ladies and Gentlemen—The topic of insect depredations is not a new one; neither are the insects which commit these depredations entirely unfamiliar to those who must bear the losses. The study of insects has become of sufficient importance to receive a distinct name by which that particular branch of natural history is to be distinguished from all others. The word ENTOMOLOGY is the one referred to.

A century ago, yes even fifty years ago, when the study of insects as well as that of allied sciences, were in their infancy, it was quite popular to ridicule the person who was at times caught looking at so insignificant a thing as an insect. Even at this late day, when matters have greatly changed, the entomologist, the botanist, or for that matter, the scientist of any kind, is not entirely exempt from ridicule. What is the good of catching or collecting together a lot of worthless "bugs" or dried weeds and pinning or pressing them and giving them house room? Why waste so much valuable time in so nonsensical a manner as this? These are questions that every collector and student of nature of the present day has frequently to reply to. Some of these questions can be answered as follows, while others need not be noticed: The collecting, naming, and describing of the forms of life about us is of great *practical* value in the further study of the habits and mode of life of each. If we have no names for insects, plants, etc., by which to distinguish one from the other, very little can be done towards gaining a definite knowledge of practical value. By building up a first-class collection of these objects and having them

properly arranged and named, one is provided with an easy mode of reference when studying an unfamiliar form. During the past few years the study of insects has assumed a direct economic importance aside from the pleasures which the student derives from his collection and his communings with nature. The direct application of entomology to the advancement of agriculture, horticulture, and silviculture has made the study second to no other branch of natural history. Since the science of entomology has called to its furtherance some of the best intellect both in this country and Europe, it is no longer considered trifling in its nature. Several of the states have engaged experts in the knowledge of insects and their life histories, while the general government considers the subject of sufficient importance to keep an entomological division in the department of agriculture, in which a corps of specialists are continually occupied in investigating the insects of our country that are sufficiently wide-spread to give them a national importance.

In order to make the importance of insect study more apparent, Dr. Lintner in the introduction to his first annual report on the injurious and other insects of the state of New York writes as follows:

“It has been truthfully said that insects have established a kind of universal empire over the earth and its inhabitants. Minute as many of them are and insignificant in size to other than naturalists, yet in combination they have desolated countries and brought famine and pestilence in their train. If unrestrained power could be given them, all counter-checks removed, and they were left free to attack us in our persons, food, clothing, houses, and domestic animals, the consequent disease, poverty, exposure, and want would, in the end, remove the human race from the face of the earth. Air, earth, and water teem with them; there may be claimed for them almost an omnipresence; they swarm in the tropics, and find a suitable home in the Arctic regions. They abound in our homes, our gardens, orchards, fields, vineyards, and forests. In the vegetable kingdom they are found in the seed, the root, the stalk or trunk, the pith, the bark, the twig, the bud, the leaf, the blossom, and the fruit—within or upon every portion of the vegetable organism. They are parasitic on our persons, and upon or within all of our domestic animals. They attack and destroy fishes and birds. They have their natural home in many of our articles of food. By their disgusting presence and annoyance they

may render our homes untenable. They burrow within our household and agricultural implements. They occasionally take possession of our books. No asylum is so secure that they may not intrude; no condition in life is exempt from their presence and attack."

There is scarcely a plant that grows, whether cultivated or wild, but that affords food and shelter to one or more species of insects. It is to the vegetable world that they are mainly indebted for their sustenance; and it has been estimated that there are, upon an average, six species of insects attacking each species of plant. Of course, upon our cultivated plants, such as garden vegetables, shrubs, trees, grasses, grains, etc., the number is much greater. In Europe, where the study of insect depredations has received much more attention than it has here in the United States, it has been ascertained that at least 537 distinct species are injurious to the oak, 107 to the elms, 264 to the poplars, and 396 to the willows; while the conifers afford a livelihood to 332 species. These insects, when they become more numerous than ordinarily, must of a necessity damage the particular plants upon which they work or feed; and, when very numerous, cause them not only to become dwarfed and sickly, but in many instances even to die.

By carefully investigating the subject of insect injuries to any special crop or plant in some particular region, the result is most startling. Professor Riley, who is certainly in a position to give us the most accurate figures attainable, in writing upon this feature of the subject, says: "The losses occasioned by insects injurious to agriculture in the United States are, in the aggregate, enormous, and have been variously estimated at from \$300,000,000 to \$400,000,000 annually."

If approximately truthful estimates could be had of the pecuniary losses resulting from insect depredations on each of our principal crops, the figures obtained would be sufficient arguments to show the importance of investigations toward their prevention. Perhaps not a single crop that is cultivated escapes without an average annual loss of at least one-tenth from this cause—an amount of injury which would be hardly noticed; but when the injury amounts to as much as one-fourth or one-half, the loss becomes much more apparent. Occasionally, however, the entire crop is destroyed. If we put this loss occasioned by insect depredations in the form of a direct tax that is levied and collected annually without the least show of resistance on our part, the matter assumes a more serious aspect. Yet this is really

what most of us are actually submitting to year after year, a fact that none of us care to admit.

In no other country perhaps upon the face of the earth are insect injuries so serious and general as in the United States—a fact that it is difficult to comprehend, yet it is only too true. Our several crops are attacked by a greater number of insect pests, and the losses that they inflict upon each of these are invariably in excess of those occurring in European countries. There are, of course, several direct causes for this condition of affairs. Some of these we cannot be responsible for, but for others we must be held directly accountable. Only a few of our various agricultural products are native to American soil, most of our fruits, grains, and garden vegetables having been imported from foreign countries. Along with these, in many instances, their attacking insect enemies were also introduced simultaneously or subsequently. A number of our household pests have also been introduced, as have the parasites which infest our domestic animals and pets. In America the large areas devoted to special crops has a tendency to increase the numbers of injurious insect enemies by furnishing an abundance of food supply, as well as magnified scope for development and increase. On the other hand we are too careless in our methods of cultivating these products of the soil to watch the insect enemies with a view to keeping them in check. From our abundance we do not miss the ten to twenty-five per cent which the insects annually collect, and, therefore, overlook their work of devastations.

THE IMMENSE NUMBER OF INSECTS.

In number of species, insects far exceed those of all the other classes of the animal kingdom combined, viz., mammals, birds, reptiles, fishes, crustaceans, worms, molluscs, etc. There have been, at least calculation, as many as 350,000 distinct species described, while fully that many more remain to be characterized. So rapidly are the new or undescribed forms being added to the public and private collections of the world that the specialists, who are occupied in this task, find it impossible to keep up with the work of naming and describing them. As an example of this inability to keep up with the new discoveries, a few references will suffice. There are in the British museum alone, at this time, fully 12,000 unnamed species, while other collections of any extent, both in this country and Europe, contain like unworked

material. Only about fifty years ago the number of named insects did not exceed 75,000 species; while at present fully five times that number are represented in named and arranged collections. The activity of the past half century among entomologists has been great, still not sufficiently so to keep apace with the accumulating material from all parts of the world. Judging from our present knowledge, and from the vast extent of the globe, which is still *terra incognita* in national science, it is not at all improbable but that the number of species will reach a full million. This too seems the more probable when we take into consideration that thus far only the comparatively large and more common forms are known.

If the distinct *species* of insects are so numerous as to be almost incomprehensible, what can we say of the *individuals* of some of the commoner and more injurious species? Dr. Fitch has given us a computation of the number of cherry tree aphids occurring upon trees growing on his grounds. These figures are recorded in his first and second annual reports on the insects of New York, page 127, where we find the following: "Among the cherry trees alluded to was a row of seven young ones which had attained a height of about ten feet. By counting the number of leaves upon some of the limbs, and the number of limbs upon the tree, I find a small cherry tree of the size above stated is clothed with about seventeen thousand leaves. These leaves could not have averaged less than five or six hundred lice upon each, and there was fully a third more occupying the stems and the tips of twigs. Each of these small trees was, therefore, stocked with at least twelve millions of these creatures." Now, if these figures only represent the number of individuals of this one insect upon seven small trees, what can we imagine the number of individuals to have been throughout the entire country? The chinch bug, Rocky mountain locust, Colorado potato beetle, Hessian fly, wheat midge, and like insects are other examples of how numerous in individuals a single species of insect may become during years of their greatest abundance.

PECULIAR AND VARIOUS MODES OF REPRODUCTION, AS WELL AS
GREAT FECUNDITY AMONG THE DIFFERENT FORMS OF
INSECT LIFE.

Among the mammals, birds, and other vertebrate animals, the modes of reproduction are very similar throughout each of the classes.

Not so, however, are the modes of reproduction among insects. The honey bee is produced in three forms, viz., queen, worker, and drone, each with a special duty to perform. The queen is female, the drone male, and the worker usually considered neither or neuter. A worker, nevertheless, often lays eggs which produce drones, while the queen lays them which produce either form, according to the size of cell in which they are deposited or the care of the young after hatched. Ants exist in several forms, males, females, workers (major and minor), and warriors. Some species of insects produce their young alive and are without sex, while in other species there are a number of forms, all of which produce young.

Most insects are very prolific and produce upwards of a hundred young for each brood ; and but few species occur in which more than a year is required for a generation. By far the greater number of species produce several or many successive broods annually. Professor Riley in one of his reports on injurious insects writes as follows concerning the modes of reproduction belonging to the Grape Phylloxera : " The full life history of the species exhibits to us no less than five different kinds of eggs. 1. The regularly ovoid egg, 0.25^{mm} long and half that diameter, of the normal, organic, and apterous female, as it is found upon the roots. 2. The similar but somewhat smaller egg of the gall-inhabiting mother. 3. The female egg from the winged mother, rather more elliptical and 0.4^{mm} long when matured. 4. The male egg from the same, $\frac{1}{4}$ less in length and rather stouter. 5. The impregnated egg 0.32^{mm} long, still more ellipsoidal and with peculiar sculpture and anal point. We have also the peculiar spectacle of an egg from the winged mother increasing from 0.34^{mm} (its size when laid) to 0.4^{mm} (its size just before hatching), giving birth to a perfect insect 0.4^{mm} long, and this without any nourishment, laying an egg 0.32^{mm} long. A being thus born, and without food whatsoever, lays an egg very nearly as large as that from which she came." So prolific are some insects that a single aphid (plant louse) is capable of producing, through its frequent generations without pairing, the enormous number of nearly six billions of descendants in a single year. It is by such prodigious multiplication that the tiny, often despised, insect attains an importance in the economy of nature not even accredited to the ravenous beast of prey, which is many thousand times larger.

An insect, because it is such, is not necessarily injurious. Far from

it! Professor Riley, whom I have already quoted several times, sums the matter up briefly as follows: "Insects play a most important part in the economy of nature. The average townsman, whose knowledge is confined to certain lectual and household pests, can scarcely appreciate the fact or have any other feeling than repugnance and contempt for the annoying hexapods of his acquaintance. Yet, as scavengers, as pollenizers of our flowers and fruits, or as food for other animals, they not only vitally concern man, but philosophically considered, are seen to be essential to his very existence. We receive, also, some direct benefits from insects. They supply us with the sweetest of sweets, our very best inks and dyes, and our finest robes and tapers, to say nothing of various acids, lacs, and waxes; while few, who have not studied the subject, have any just idea of the importance of insects and their products as articles of human diet."

THE NECESSITY OF A KNOWLEDGE OF INSECT HABITS.

Without a knowledge of an insect's habits and life history, but little can be done towards resisting its depredations; and until we know which and what these enemies are, we cannot begin to learn about their life history and habits. We are told *who* they are, when they have been given scientific names by which they are to be known throughout the civilized world wherever they may occur; and we are prepared to learn *what* they are when they have been so intelligently described and carefully figured that they can be recognized or identified by the agricultural as well as the scientific student. When this has been accomplished, hundreds of persons, in different localities, may then be simultaneously engaged in the study of the same insect; and each of the facts concerning it can be separately recorded as discovered until a sufficient number of these have been accumulated to be of use when collated to determine its life history. The habits of the different species of insects are so diverse as to necessitate a separate study for each of them with which we have to do. Each of these life histories is a complicated one, and embraces at least four distinct forms of animal existence — the egg, the larva, the pupa, and the imago — which may differ so greatly, one from the other, that none but the entomologist would suspect the relationship between them. One or more of these forms may be so artfully hidden away, or be existing under such peculiar circumstances, as to elude discovery for a long time, and thereby

prevent our gaining a complete history of the insect under investigation. As much as we now know about some of the insect enemies most common to the country, there is still more to be learned. "Among the first hundred of our most injurious insects, there are those which we only know in their final stage, and there is not the naturalist among us who could identify them in their larval or their pupal state; while at least one-half of the number could not be determined in the egg." Such a confession is certainly humiliating to the entomologist, but nevertheless it is a strong argument in favor of continued investigation of the lives of insects. Until the several stages of an insect's existence are known, together with the conditions under which they occur, it is quite evident that the entomologist is unprepared to point out the particular phase in which the insect is most vulnerable, and therefore the most readily combated.

All of these studies are tedious to say the least, and often involve earnest, long continued, and painful cloister work with the microscope as an aid. Other needed information can only be gained out of doors, in the field, orchard, and forest, where the observer must faithfully pursue his investigations during sunshine and rain as well as by day and night. So very many are the details that must often be taken into consideration ere the life history of an insect enemy is sufficiently complete to be of much use in its repulsion, that years of labor are required by the united efforts of several observers. The number of persons who are at present devoting their entire time, or the greater portion thereof, to the subject of economic entomology in the United States is less than four dozen—a ridiculously small number indeed, in comparison with the amount of work to be done, the vast territory to be studied, and the lead which our country takes in the line and extent of its agricultural interests over that of other countries of the globe. Such a condition of affairs is certainly to be deplored, when we take into consideration the efforts that are put forth and the vast sums of money expended in other directions where the losses sustained do not begin to compare with those resulting from insect depredations. All that I ask is that an equal amount of interest be accorded the subject of economic entomology.

AGRICULTURAL EXPERIMENT STATIONS AND WHAT IS BEING DONE
BY THEM IN THE DIRECTION OF INSECT INVESTIGATION.

Since the establishment of the agricultural experiment stations in the several states under the provision of national legislation known as the "Hatch bill," the subject has received quite an impetus. There are now at least a dozen of these stations that employ entomologists whose sole duty is the investigation of injurious insects with a view to finding remedies against their ravages. Several of these stations are expending their greatest efforts in this direction, while others of the stations are less liberal with their funds in aiding their entomologists. Of course the entomologist with only a salary cannot be expected to obtain the results secured by one who is provided with a well equipped laboratory and a good working library, together with funds ample for carrying on such field experiments as are absolutely essential to success.

Here in Nebraska several bulletins have been prepared by the entomologist and issued from the station. Several lectures have been prepared and delivered before horticultural and agricultural meetings, and occasional papers on special insects prepared for the press. There are now several other bulletins under way and nearly ready for the printer. One of these bulletins is a treatise on the grasshopper, katydids, and crickets of Nebraska, which will contain descriptions of about 240 distinct species of these insects, the majority of which are directly injurious to agriculture and horticulture. A bulletin on plant-lice and one on beet insects are also under way. These works will contain chapters devoted to remedies, as well as to the disease, and natural enemies of these insects, vertebrate and invertebrate. With the aid of the farmers, fruit-growers, and gardeners of the state, it is the intention of the station officers to continue this work as rapidly as possible. Of course, without much of this outside assistance we can do but little. We are willing to do the work if the other parties will only furnish a portion of the material which they want studied.

THE APPLE-TREE ROOT LOUSE.

(*Schizoneura lanigera* Hausm.)

This plant louse, which appears in two forms, has become quite plentiful in portions of the state within the past two or three years. One of these forms (Fig. 1) works upon the roots of the tree from

one to several inches below the surface, where it does much injury. It is especially destructive to nursery stock where it is permitted to multiply from year to year. The presence of this root form is readily detected by the wart-like swellings which its attacks produce upon the roots; also by the "moldy" appearance of the root and surrounding earth. The lice insert their beaks into the bark of the roots and extract the juices which would otherwise go to nourish the tree. When they are very numerous their injuries cause the roots to gradually decay; and if they continue in their attacks the trees eventually die.

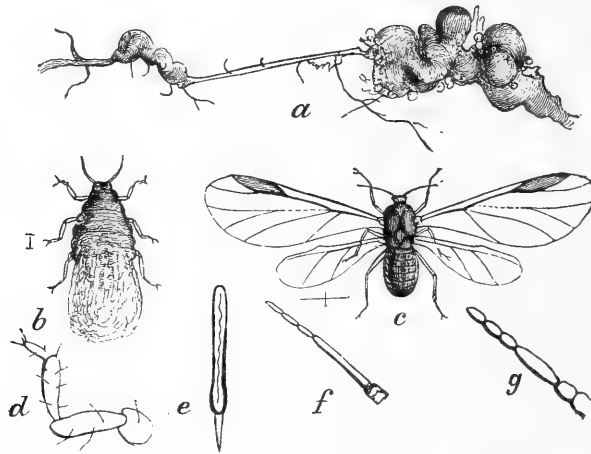


FIG. 1.—The Apple-tree Root Louse: *a*, rootlet showing galls; *b*, wingless or apterous louse; *c*, winged insect; *d*, *e*, *f*, and *g*, parts of louse, showing structure. Figs. all magnified, except *a*. [After Riley.]

If upon examination you should discover these irregularities upon the finer roots of your apple trees, and at the same time notice the moldy looking spots, you may be sure that this louse is present, and needs looking after. A closer examination will reveal the small, pale-yellow lice, which sit concealed beneath their flaky covering in the crevices of the root deformities which their attacks have produced. These are also frequently accompanied by winged individuals of larger size. The wingless lice have their bodies covered with a bluish-white cottony substance, already mentioned as the "moldy" substance, which is secreted from the upper portion of the bodies of the wingless lice and hangs to their bodies in a tuft of filaments which are frequently five or six times the length of the lice themselves. In Fig. 1, *a* represents the affected root, *b* a wingless louse, and *c* one with wings. The size of these insects is indicated by hair lines alongside of the figures.

Saunders speaks of this insect as follows in his work entitled "Insects Injurious to Fruits:" "The apple root plant louse is believed by some entomologists to be a native insect, while others hold to the opinion that it has been imported from Europe. It is nourished by sucking the juices of the tree, piercing the tender roots with its proboscis. In the very young lice this instrument, when at rest and folded under the abdomen, is longer than the body, but in the mature specimens it is only about two-thirds the length of the body. While it usually confines itself to the roots of trees, it is sometimes found on the suckers that spring up around them, and sometimes also about the stump of an amputated branch, but in every instance it may be recognized by the bluish-white cottony matter with which its body is covered. If this cottony covering be forcibly removed, it will be found that in two or three days the insect will have again produced sufficient to envelope itself completely. Occasionally the mature lice crawl up the branches of the trees during the summer, where they also form colonies, and then are known as the Woolly Aphis of the apple." In speaking of this form of the louse now under consideration the same author says: "They are often found about the base of twigs or suckers springing from the trunk, and also about the base of the trunk itself, and around recent wounds in the bark. In autumn they commonly affect the axils of the leaf stalks, towards the ends of twigs, and sometimes multiply to such an extent as to cover the whole under surface of the limbs and also of the trunk, the tree looking as though whitewashed. They are said to affect most those trees which yield sweet fruit. This woolly louse is very common in Europe, especially in Germany, the north of France, and England, where it is more destructive than in this country, and, although generally known there under the name of the "American blight," it is believed to be indigenous to Europe, and to have been originally brought from Europe to America. It appears to thrive only in comparatively cold climates, and in this country occurs in this [above ground] form most abundantly in the New England states.

"Under each of the little patches of down there is usually found one large female with her young. When fully grown the female is nearly one-tenth of an inch long, oval in form, with black head and feet, dusky legs and antennæ, and yellowish abdomen. She is covered with a white mealy powder, and has a tuft of white down grow-

ing upon the hinder part of her back which is easily detached. During the summer the insects are wingless, and the young are produced alive, but about the middle of October, among the wingless specimens appear a considerable number with wings, and these have but little of the downy substance upon their bodies, which are nearly black and rather plump. The fore wings are large and about twice as long as the narrower hind wings. Late in the autumn the females deposit eggs for another generation the following spring, a fact which should induce fruit growers to take particular pains to destroy these lice wherever found, for the colony that is permitted to establish itself upon some worthless tree, or on the shoots or suckers at its base, will furnish the parents of countless hosts that may establish themselves next year on the choicest trees in the orchard. The insects are extremely hardy and will endure a considerable amount of frost, and it is quite probable that some of them survive the winter in the perfect state in the cracks of the bark of the trees.

“The eggs are so small that they require a magnifying glass to enable one to see them, and are deposited in the crevices of the bark at or near the surface of the ground, especially about the base of suckers, where such are permitted to grow.

“The young, when first hatched, are covered with very fine down, and appear in the spring of the year like little specks of mold on the trees. As the season advances, and the insect increases in size, its cottony coating becomes more distinct, the fibres increasing in length and apparently issuing from all the pores of the skin of the abdomen. This coating is very easily removed, adhering to the fingers when touched. Both young and old derive their nourishment from the sap of the tree, and the constant punctures they make give rise to warts and excrescences on the bark, and openings in it, and, where very numerous, the limbs attacked become sickly, the leaves turn yellow and drop off, and sometimes the tree dies.”

This louse was noticed as early as 1848, at which time it was found upon thousands of small trees in such large numbers that the destruction of the trees was necessary. Since that time it has been gradually spreading over the country until it has become quite general save in isolated localities.

REMEDIES.

Like all other plant lice; the present species is preyed upon by a large number of predaceous and parasitic insects, such as lady-birds, lace-wing flies, syrphus flies, and several very minute hymenopterous parasites. Some of these are shown in Figs. 2 to 8.

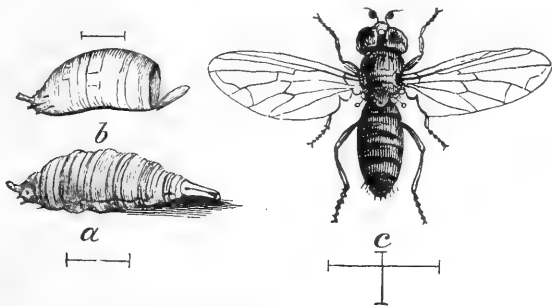


FIG. 2. — The Root-louse Syrphus-fly (*Pipiza radicum*): a, larva or maggot; b, puparia; c, fly. [After Riley.]

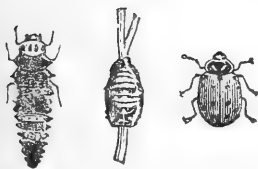


FIG. 3. — *Hippodamia convergens*. [After Riley.]

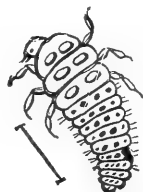


FIG. 4. — Larva of Ladybird. [After Riley.]



FIG. 5. — *Hippodamia 13-punctata*. [After Riley.]



FIG. 6. — *Coccinella 9-notata*. [After Riley.]



FIG. 7. — *Hippodamia maculata*. [After Riley.]

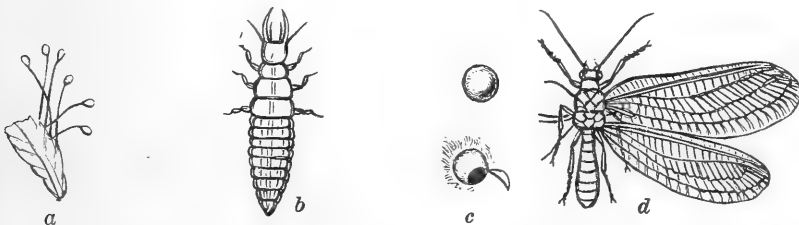


FIG. 8. — Lace-wings: a, eggs on leaf; b, larva; c, d, mature insect. [After Riley.]

When artificial means must be employed, and this should be done just as soon as the lice first appear, the "kerosene emulsion" remedy should be applied to the above ground form, while for the root form Saunders writes: "The most successful means yet devised for destroy-

ing these root lice is the use of scalding hot water freely poured around the roots of the trees. If the trees are to remain in the soil, the roots may be laid bare, and the water used nearly boiling without injury; but where they have been taken up for the purpose of transplanting, and are to be dipped in the hot water, the temperature should not exceed 150° Fahr.; under these circumstances, from 120° to 150° would suffice for the purpose. A mulch placed around the trees for some time previous to treatment has been found useful in bringing the lice to the surface, where they can be more readily reached by the hot water. Drenching the roots with soap-suds has also been recommended, to be followed by a liberal dressing of ashes on the surface."

THE APPLE-TREE APHIS.

(*Aphis mali* Fabr.)

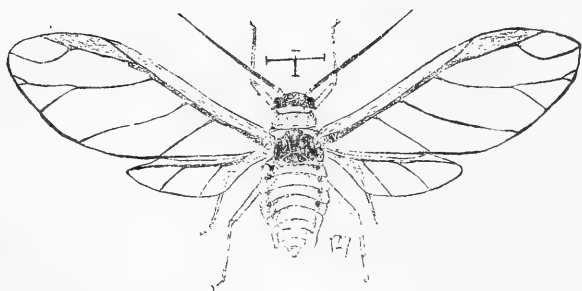


FIG. 9. — The Apple-tree Aphis (*Aphis mali*), winged viviparous female. [Original, drawing by T. A. Williams.]

Recently another plant louse has been doing considerable injury to the apple trees of some portions of eastern and southeastern Nebraska. This latter insect is the one commonly known as the Apple-tree Aphis. It differs considerably from the root louse of the apple in several points, as will be seen by reference to figures 9 and 10, the former representing a wingless and the latter a winged louse. As will be seen in the figures, this louse of both forms is provided with a pair of honey tubes, which issue from the upper surface of the abdomen near its apex. It also has the body destitute of any covering like that found upon the root louse; and its antennæ or feelers are as long as its body, while the legs are also long and slender. In color the Apple-tree Aphis is green or greenish yellow, the winged specimens, as well as the apterous, being marked to some extent with black.

The presence of this louse in an orchard can be readily detected by the curled appearance of the leaves which it infests. When the insects attack a leaf it curls or twists around so as to shelter them from rain, as well as to afford a partial protection against its natural enemies. The life history of this plant louse is given briefly as follows by the author already quoted:

"During the winter there may often be found in the crevices and cracks of the bark of the twigs of the apple tree, and also about the base of the buds, a number of very minute, oval, shining black eggs. These are the eggs of the Apple-tree Aphis, known also as the Apple-leaf Aphis, *Aphis malifoliae* Fitch. They are deposited in the autumn, and when first laid are of a light yellow or green color, but gradually become darker, and finally black.

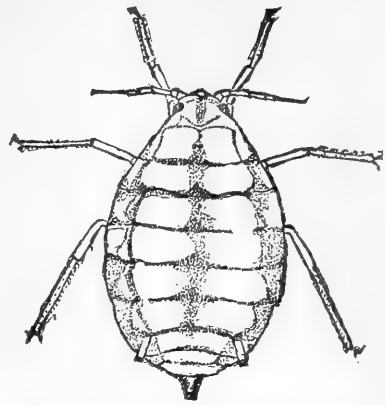


FIG. 10.—The Apple-tree Aphis (*Aphis mali*), apterous viviparous female. [After Weed.]

"As soon as the buds begin to expand in the spring, these eggs hatch into tiny lice, which locate themselves upon the swelling buds and the small, tender leaves, and, inserting their beaks, feed on the juices. All the lice thus hatched at this period of the year are [viviparous] females, and reach maturity in ten or twelve days, when they commence to give birth to living young, producing about two daily for two or three weeks, after which the older ones die. The young locate about the parents as closely as they can stow themselves, and they also mature and become mothers in ten or twelve days, and are as prolific as their predecessors. They thus increase so rapidly that as fast as new leaves expand colonies are ready to occupy them. As the season advances, some of the lice acquire wings, and, dispersing, found new colonies on other trees. When cold weather approaches, males as well as females are produced, and the season closes with the deposit of a stock of eggs for the continuance of the species another year."

The habits of this aphis are very similar to that of the Boxelder Plant-louse, mentioned in the report for 1889; and it is usually kept within bounds by the same insect enemies that attack that and other plant lice.

REMEDIES.

The kerosene emulsion if sprayed over the trees at the time of hatching or afterwards will kill all the lice that it reaches. If strong soap-suds are sprayed upon the trees at the time the buds are opening, or if weak lye or tobacco water be used instead, many of the young lice will be destroyed. Saunders says: "A frost occurring after a few days of warm weather will kill millions of them; in the egg state the

insects can endure any amount of frost, but the young aphides quickly perish when the temperature falls below the freezing.

The predaceous insects that attack this and other plant lice are shown in Figs. 3 to 8 and also Figs. 11 and 12. All of these are our friends and should become familiar to us so that we can protect and assist them in their good work.

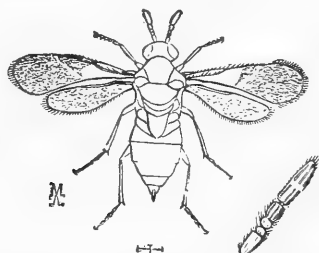


FIG. 11.—The Apple Aphid parasite (*Aphelinus mali*) — enlarged. [After Riley.]



FIG. 12.—The Comely Lady-bird (*Coccinella venusta*) — slightly enlarged. [After Riley.]

CODLING MOTH NOTES.

Every year the Codling moth or Apple-worm appears to be a little more injurious than it was the previous one ; and unless some decided steps are taken here in the west towards its destruction, our apple crop will be more and more affected year after year by its ravages. True, it has been ascertained by the entomologists and other observers of bugs and such like vermin, that there are a number of friendly insects that destroy the pest in one or the other of its stages of growth. But let us not stop here even if we do know that a dozen or more friends are at work trying to rid the orchard of this destructive insect. Let us lend a hand by doing our “share of destruction.” At one time, and that, too, within the past few years, the only remedies known against this pest were hand picking, the use of bandages, lights, etc., together with the gathering and feeding of wind-falls. Now, that we have learned that the arsenites applied in water with a force pump have a very beneficial effect in the reduction of the insect, it is within our power to have apples without worms or worm holes.

If our trees are carefully sprayed after the apples have fairly “set” and before they “droop” on the stems it has been pretty well proven that most every worm will be destroyed before it enters the apple. This is accounted for in this wise ; the eggs are laid in the flowers among the calices or green leaf parts of the blossoms. These eggs are hatched and the young worms feed about for some little time prior to entering the fruit, and in so doing are poisoned when poison is present

If rains occur a second or even a third spraying may be of value. Sometimes in dry weather a second spraying eight or ten days after the first application will destroy many additional worms. The more of the spring brood that are destroyed the fewer there will be to lay eggs for a second or summer brood — the brood that we find during late fall and winter in late

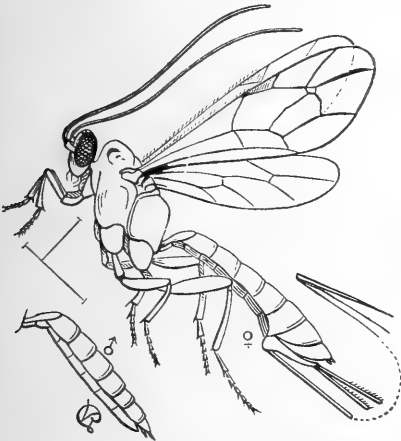


FIG. 13.—The Banded-legged Pimpla (*Pimpla annulipes*)—enlarged. [After Riley.]

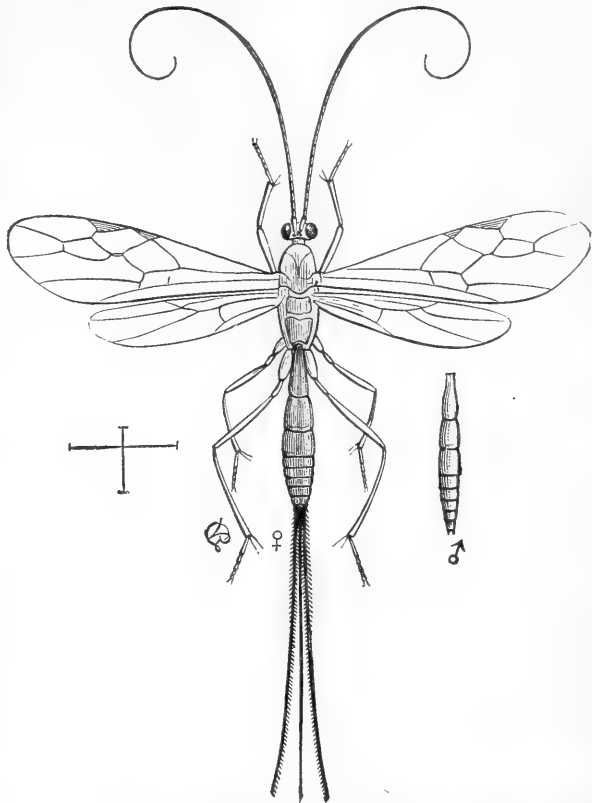


FIG. 14.—The Delicate Long-sting (*Macrocentrus delicatulus*)—enlarged. [After Riley.]

apples. Two of these hymenopterous parasites that destroy the codling moth are shown in Figs. 13 and 14. They are known as the Ring-legged Pimpla (*Pimpla annulipes*) and the Delicate Long-sting (*Macrocentrus delicatulus*). During the past summer the larva of one of our lampyridæ or “fire-bugs” was found feeding upon the apple worm at Crete.

A NEW STRAWBERRY SAW-FLY.

In last year's Horticultural Report, on page 207, attention was called to a saw-fly that attacks and injures the strawberry plant. During the present summer my attention was called to this insect by several persons who have had strawberry vines suffer from its injuries. Here in the city of Lincoln a couple small beds of vines were completely stripped by the worms before berry time.

A careful watch should be kept by strawberry growers for this in-

sect's appearance in their beds, since it appears to be on the increase and is sure to spread over the state wherever strawberries are raised.

A second species of strawberry saw-fly is reported to occur in some portions of the country, and may also reach our state ere long. This latter insect has received the attentions of a Mr. F. W. Malley, who studied its habits and life history quite thoroughly. An abstract of his notes is given in vol. II of *Insect Life*, p. 137. Like the other spe-

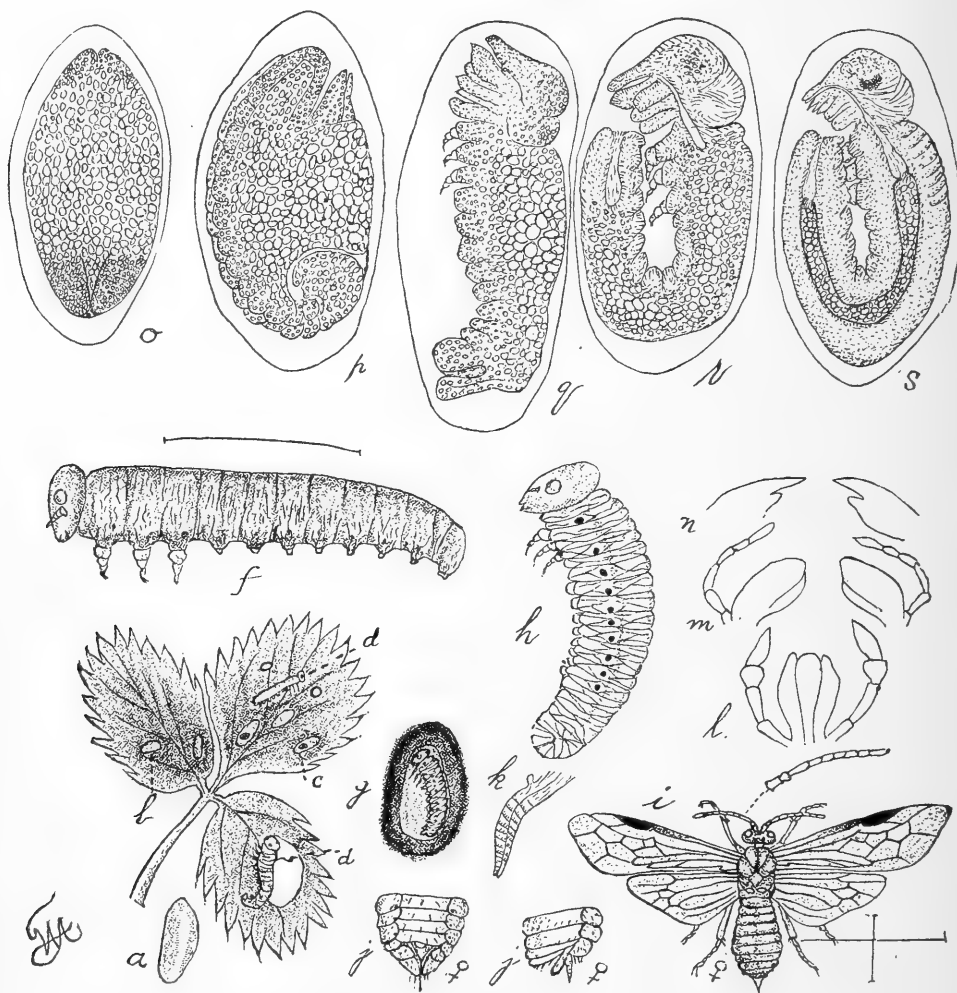


FIG. 15.—*Monostegia ignota*: a, egg; b, leaf showing egg-blisters; d, d, and f, larvæ; g, cocoon; i, female fly—hair lines indicate size of the object illustrated; o, p, q, r, and s, development of larva in egg. [After Malley, from *Insect Life*.]

cies, this new strawberry saw-fly devours the leaves and blossoms of strawberry vines in Iowa, Illinois, and Indiana. It is described as follows in the article referred to:

"The adults of this species are black four-winged saw-flies, about .28 inch long. By displacing the wings, characteristic dull whitish

spots are seen on the back of the abdomen. However, the casual observer who depends on this character alone is liable to be misled, as there is another species of saw-fly — *Harpiphorus maculatus* — [the common strawberry saw-fly] closely resembling it, and having similar markings on the back of the abdomen. The most certain method of distinguishing the two species is to note the number of submarginal cells in the fore wings, *Monostegia ignota* [the new one] having four, and *H. maculatus* only three.

“Adult saw-flies of this new strawberry pest were found depositing eggs from the 1st to the 25th of April, the period of greatest deposition being from the 10th to 20th. Adult females were captured, confined, and eggs obtained that have furnished larvæ which have been carried through all the larval stages and their habits studied in connection with observations in the field. The eggs are deposited singly on the under side of the leaf, just beneath the epidermis. In no case were the eggs found deposited in the petiole of the leaf, as is said to be the habit in *H. maculatus*, but frequently alongside or in the angle between two veins; seldom more than three or four eggs are found deposited in a single leaflet.

“When first deposited the eggs (Fig. 15, *a*) are pure white, tapering towards both ends, one side slightly concave, the other quite convex; are .475^{mm} wide by .875^{mm} long. The point of deposition can hardly be seen at first, but the swelling of the eggs, due to the developing embryo, causes light-colored blisters of 0.6—.75 by .75—1^{mm} in size.” * * * “When ready to issue the young larvæ eat a small hole through the inclosing epidermis and emerge. At first they are slender 22-footed slugs; bodies white, translucent, much wrinkled; granular; 2—2.3^{mm} long; upper part of the head cream colored; claws of the pectoral legs, eyes, labrum, mandibles, brown; remaining mouth parts, whitish brown; ring around the eyes black. The young worms begin their ravages at once, eating small holes through the leaves. After feeding six or seven days they pass through the first moult, are about one-half larger, the dorsal and lateral surfaces yellowish green, ventral surface pale. At each of the three succeeding moults, all of which occur within the next eight or ten days, the color is of a deeper green. The larvæ when full grown are between .55 and .65 inch long. Head and mouth parts, claws, and first joints of the pectoral legs are of a more distinct brown; body a beautiful

deep green, much wrinkled, with one dorsal and two lateral obscure blackish stripes. Anterior segments but slightly larger than the posterior ones.

"By the 1st of May the worms begin maturing and entering the earth, and by about the 1st of June all have entered the ground. Entering the earth to the depth of an inch or so, a frail earthen cocoon is formed, on the inside of which there is a thin silken lining. Larvæ in cocoons formed May 1st have shrunk to one-half of their original length, but up to date (August 22) have not pupated. The shrunken larvæ still retain their green color, but the stripes are more distinct, due, no doubt, to the fact that they have been crowded into about one-half their original length."

In speaking of this saw-fly the writer says: "The larvæ of *M. ignota* have infested the strawberry beds on the college grounds [at Ames, Iowa] for several years, feeding on the leaves, and would, if numerous enough, threaten the crop. This has not been the case here [Illinois, Champaign], but reports from other parts of the state say that 'the worms are simply ruining our plants.'" He states further, "As to the geographical distribution of this species, little can be said just now. Among the specimens from which Norton described *M. ignota* was one from Illinois, and *M. obscurata* Cresson [considered as being identical with *M. ignota*] from material collected in Colorado.

REMEDIES.

"The period of greatest abundance of the worms is from about the 25th of April to 5th of May, though they begin appearing about the middle of April. Hence most of the worms have hatched before the vines are well in bloom, feed, mature, and again disappear by the last of May, before much fruit has ripened. It will, therefore, be perfectly safe to apply any of the arsenical poisons with great efficiency, as early as April 20th to 25th, and with comparative safety about the 1st of May."*

Mr. Malley found but a single insect enemy that preyed upon the worms in large numbers, this was one of the true bugs *Coriscus fesus*; no true parasites were reared.

* I would not advise the too free use of the arsenites in the destruction of strawberry insects during the spring, unless sufficient rain falls after the application of the poisons and prior to the ripening of the fruit. Some injury might result to those eating the fruit.

THE FIERY FLEA BEETLE.

(Haltica ignita Illig.)

While treating strawberry insects it might not come amiss to mention one of our flea beetles that has been observed in the act of injuring that plant during the past spring. There have been several complaints filed against this culprit; but the most severe comes from distant Florida, where, as the informant writes to the editor of *Insect Life*, "They appeared on my strawberries in *thousands*. You can judge of their number when I tell you that all sent were taken by holding the box under one leaf and shutting the cover down on it, and I expect you will find at least twenty-five or thirty in the box, and they are numerous all over the patch. All the berry fields in this neighborhood are infested."

Here in Nebraska the beetle is not as plentiful as it is further south, but it is sufficiently common to warrant us to keep a lookout on its movements. Being a rather general feeder, like many of our other flea beetles, it is quite liable to do damage where least expected.

It is moderately robust in form, nearly one-eighth of an inch in length, and is of a deep purplish metallic color and shines with a fiery luster, hence the name *ignita*.

REMEDIES.

The remedy given for the Apple-tree Flea Beetle in last year's report will answer for this one also when the plant or plants affected are not among the food-list; even then, if the proper precautions are taken, the London purple and Paris green remedies may safely be used. If, however, the beetles should attack the strawberry vines at a time when the fruit might be injured or even rendered possibly dangerous for food, these poisons should not be used. At such times air-slaked lime, if dusted over the plants, will usually drive away the insects.

SWEET POTATO INSECTS.

Several years ago I planted a small patch of sweet potatoes at West Point in this state. Soon after the vines began to run they showed signs of insect attack; and in two or three instances were entirely stripped of leaves by the united work of several species of insect enemies. These enemies belonged to two different orders, viz., Coleop-

tera and Hymenoptera. Of the former at least three or four distinct species were at work, while of the latter but a single one was noticed.

By a reference to the accompanying cut it will be seen that the sweet potato saw-fly (*Schizocerus ebenus*) bears a strong general resemblance to other species of the group with which we are more or less familiar. One difference at once noticeable is the forked or double antennæ in this insect. This saw-fly has become quite a dangerous pest to the sweet potato crop in Mississippi, where it has been at work since 1886.

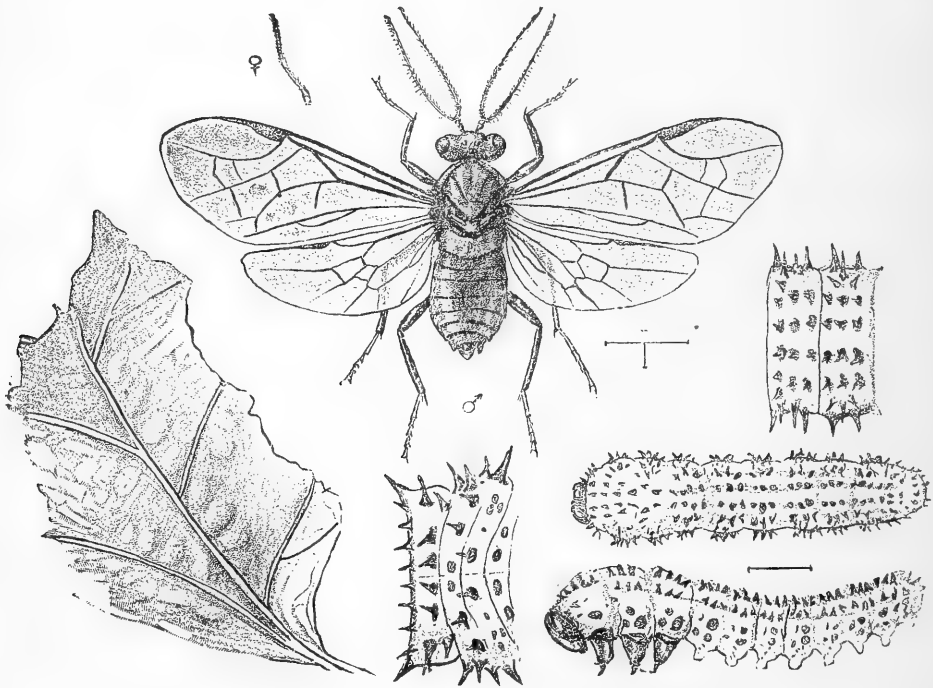


FIG. 16.—The Sweet Potato Saw Fly (*Schizocerus ebenus*). [After Riley.]

Judging from what I find published about this saw-fly in vol. I of *Insect Life*, pp. 43-5, it must be at least a double brooded if not a many brooded insect, and if it should become thoroughly adapted to the sweet potato as a food plant, will be a dangerous and troublesome enemy to handle. That it is a comparatively new enemy to this plant is evidently true, since no former reports of its injury to the sweet potato have come to my notice. It is evidently a feeder upon the wild morning glory, since its range is quite wide. The original specimens from which the species was described were collected in New York state, while I have on several occasions taken it here in Nebraska. While I have

never found the larvæ feeding upon the vines, I have taken the imagoes flying about them as well as the morning glories spoken of above.

This fly is described as "a small four-winged creature, about the size of a common house fly, or a little smaller. It is black, and the wings are dusky. The female abdomen is yellowish brown." It is shown in the accompanying illustration (Fig. 16) in egg, larva and imago stages.

Sweet potato beetles differ somewhat from the insects that attack the ordinary potato, in their structure. A reference to Figs. 18, 20, 21, and 22, will give the reader an idea of the appearance of these insects which are popularly called tortoise beetles—a very good name indeed, since their shape and general movements remind one very forcibly of that animal.

Here in Nebraska we are more or less frequently reminded of the fact that these tortoise beetles are quite partial to the sweet potato vines as a food plant. There are at least four or five distinct species of these beetles concerned in these attacks here in the state.

The tortoise beetles have been admirably described in vol. I of the American Entomologist, by Prof. C. V. Riley and B. D. Walsh, and I cannot do better than to quote from that article in treating of them here. These gentlemen write of the beetles as follows:

"The insects which attack the sweet potato plant are few in species and belong almost entirely to that group of beetles popularly known as tortoise beetles. With the exception of the Cucumber Flea beetle (*Crepidodera cucumeris*), and a few solitary caterpillars, we have never found any other insect on this plant; but we regret to say that these tortoise beetles are of themselves sufficiently numerous in individuals and species to often entirely destroy whole fields of this esculent, and they are especially severe on the plants when newly transferred from the hot-bed.

"These insects are at present included in the great family Chrysomelidæ [the family of leaf beetles, which includes the Colorado potato beetle, Striped Cottonwood beetle, flea beetles, etc.], though they were formerly placed in a separate family (Cassididæ) by themselves, and there certainly are few groups more strongly characterized. They are almost all of a broad subdepressed form, either oval or orbicular, with the thorax and wing-covers so thoroughly dilated at the sides into a broad and flat margin as to forcibly recall the appearance of a

turtle, whence the popular name. Many have the singular power, in a greater or less degree, of changing their color when alive, and as we shall show further on, some of them shine at will with the most brilliant metallic tints."

In speaking of the larval habits of these beetles, the writers of the article from which I have quoted dwell at length upon a peculiar habit common to all of these tortoise beetles, as well as to a number of allied forms, viz., the use of their excreta as a sort of shield or protection against predaceous insect enemies and parasites.

"The larvæ of all the species that have been observed are broad and flattened like the beetles, and have the margins of the body furnished with spines which are often barbed (see Figs. 19, *b* ; 21, *a*). Usually there are thirty-two of these spines, or sixteen on each side of the body. Four of these are situated on the prothorax, which forms two anterior projections beyond the common margins; four of them—the two anterior ones longer than the others—are on each of the two following thoracic segments, and each of the abdominal segments is furnished with but two. There are nine elevated spiracles each side superiorly, namely, one immediately behind the prothorax and eight on the abdominal segments. The fore part of the body is projected shield-like over the head, which is retractile and small. Almost all of the larvæ of the beetles belonging to the great *Chrysomela* family, of which the Colorado potato bug may serve as an example, have, besides the six legs at the anterior end of the body, an additional proleg, or protuberance which serves as such, at the posterior end; but the larvæ of our tortoise beetles have no such proleg, and the six anterior legs are short, thick, and fleshy, and, with the retractile head, give these larvæ, from a side view, as great a resemblance to a turtle as have the beetles.

"Though lacking an anal proleg, however, they are characterized by having a movable forked tail, in the shape of two long, prong-like, horny filaments, which both spring from a broad neck situated immediately above the anus. This latter projects and curves over the back at the will of the insect, and by the aid of this fork and of some of the lateral spines, it forms the parasol of dung which so nicely protects it. * * *

"All the tortoise beetle larvæ which we have bred, have come to their growth in about three weeks after hatching. They cast their

skins at three successive periods, and these skins are slipped on to the fork, where in most instances they remain. On carefully detaching from a full grown larvæ the dung with which these skins are mixed, these three successive skins are easily recognized, the smallest being at the extremity and the largest at the base of the fork. They are especially recognizable in the mottled species (*Coptocycla guttata*) shown in Fig. 21, which removes most of its dung before each moult.

"The eggs from which these larvæ hatch, and which we do not recollect to have seen anywhere described, are deposited singly upon the leaves, to which they are fastened by some adhesive substance. They are of irregular angular form; flat, and somewhat narrower at one end than the other; ridged above and at the sides, but smooth and obovate below. They are usually furnished with spine-like appendages, which, however, are sometimes entirely lacking. Those of *Coptocycla aurichalcea* [shown greatly magnified at Fig. 17] are 0.04 inch long, and of a dull, dirty-white color.

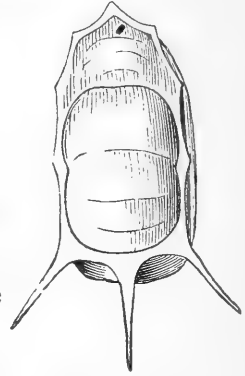


FIG. 17.—Egg of the Golden Tortoise Beetle, greatly enlarged. [After Riley.]

"When full grown the larvæ fasten the last two or three joints of the body to the underside of a leaf, by means of a sticky secretion, and in about two days change to pupæ. The pupa is also flat with usually four or five broad, but thin and transparent serrated leaf-like appendages on each side of the abdomen, and the prothorax, which is greatly dilated and covers the head, is furnished around the edge with smaller barbed spines. The broad leaf-like spines at the edges of the body are bent under while the transformation is being effected, but are soon afterwards stretched stiffly out with a forward slant. The pupa loses the pronged tail, but as the old larval skin is left adhering to the terminal segments the prong of dung still protects it in most cases. The legs and antennæ are not free in this, as in the pupæ of most other beetles, but are soldered together as in the chrysalis of a butterfly, and yet it has the power of raising itself up perpendicularly upon the tail end by which it is fastened. The pupa state lasts about a week."

Having given an outline of the life history of these peculiar, though beautiful little beetles, I will devote a little space to each of the several species that are found in the state. Since all of these in-

fest the sweet potato both in the larval and beetle state, a slight knowledge of each will not be amiss to the gardener. Their mode of attack is to gnaw irregular holes in the leaves from below. The time of greatest abundance is during the months of May and June. Several broods are reared annually; and the beetles hibernate under various shelters, as leaves, grasses, sticks of wood, pieces of bark, boards, cow droppings, etc.

THE TWO-STRIPED SWEET POTATO BEETLE.

(*Cassida bivittata* Say.)

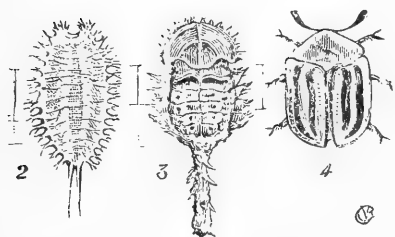


FIG. 18.—The Two-Striped Sweet Potato Beetle (*Cassida bivittata*); 2, larva; 3, pupa; 4, imago. [After Riley.]

Our commonest species of these beetles in Nebraska is the one shown in the accompanying illustration (Fig. 18). It is dirty yellow with two black lines upon each elytron or wing cover, as shown in the figure at 4. The larva is dirty white or yellowish white, with a more or less distinct blackish line along its back, usually bordered on each side by a narrow one of a lighter shade than that of the body. It also differs from the larvæ of all the others of our species in lacking the shield of excrement common to them.

Another of these beetles is what is known as the

GOLDEN TORTOISE BEETLE.

(*Coptocycla aurichalcea* Fabr.)

This insect is shown in Figs. 19 and 20. It is our next common-

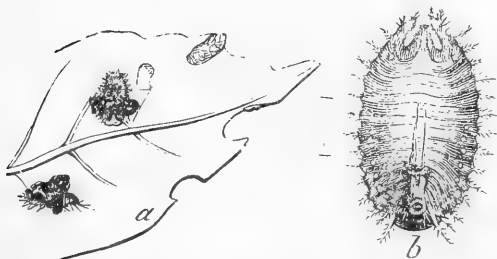


FIG. 19.—The Golden Tortoise Beetle (*Coptocycla aurichalcea*); a, leaves with larvæ; b, larva—enlarged. [After Riley.]

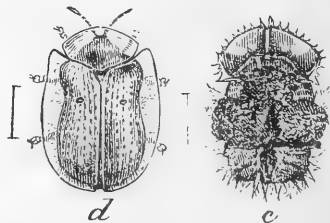


FIG. 20.—The Golden Tortoise Beetle (*Coptocycla aurichalcea*); c, pupa; d, beetle—enlarged. [After Riley.]

est species upon the sweet potato, and also occurs in equal abundance upon the wild morning glories, as well as on the bitter-sweet and sev-

eral other plants. The larva of this species (Fig. 19, *b*) is of a dark brown color with a lighter dorsal area, and has the appearance of the illustration after the excreta has been removed from the anal fork. Riley says: "It carries its fæcifork immediately over the back, and the excrement is arranged in a more or less irregular trilobed pattern. The loaded fork still lies close to the back in the pupa, which is brown, like the larva, and chiefly characterized by three dark shades on the transparent prothorax, one being in the middle and one at each side.

"The perfect beetle (Fig. 20, *d*), when seen in all its splendor, is one of the most beautiful objects that can well be imagined. It exactly resembles a piece of golden tinsel, and with its legs withdrawn and body lying flat to a leaf, the uninitiated would scarcely suppose it to be an insect, did it not suddenly take wing while being observed. At first these beetles are of a dull, deep orange color, which strongly relieves the transparent edges of the wing-covers and helmet, and gives conspicuousness to six black spots, two above and two on each side. But in about a week after they have left the pupa shell, or as soon as they begin to copulate, they shine in all their splendor, and these black spots are scarcely noticed."

A third species of these beetles is what is commonly termed

THE PALE-THIGHED TORTOISE BEETLE.

(*Coptocycla pallida* Herbst.)

It can hardly be distinguished from the preceding, and is evidently but a form of that species. "It is of a somewhat broader, rounder form, and differs in lacking the black spots on the wing-covers, and in having the thighs entirely pale yellow, while in *aurichalcea* they are black at the base. It likewise feeds upon the sweet potato, and its larva differs only from that of the former in its spines being brighter and lighter colored, and in having a dull orange head, and a halo of the same color on the anterior portion of the body."

A fourth tortoise beetle that feeds upon the sweet potato vines in this state is

THE MOTTLED TORTOISE BEETLE.

(*Coptocycla guttata* Oliv.)

This beetle is shown in Fig. 21, *a*, *b*, and *d*, and is characterized briefly as follows by Riley: "It is at once distinguished from all the others here described by being usually black, with the shoulders black

to the extreme edge of the transparent wing-covers. It is a very variable species, and is frequently more or less speckled or mottled with gold, while more rarely it has a uniform golden appearance.

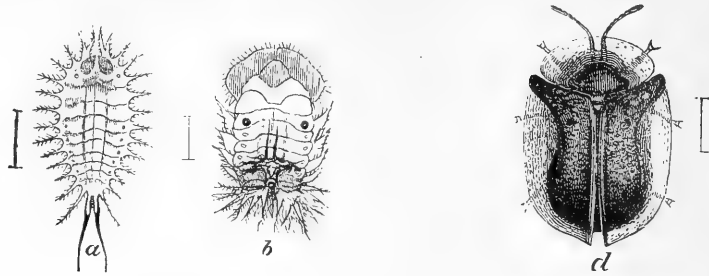


FIG. 21.—The Mottled Tortoise-beetle (*Coptocycla guttata*): a, larva; b, pupa; d, beetle—all enlarged. [After Riley.]

“The larva is of a uniform greenish color, relieved by a bluish shade along the back, when fully fed, but which fades away after the insect has fasted for a few hours. It carries its dung in irregular broad masses, often branching as in the species next to be described. The pupa (Fig. 21, b) is also of a uniform green color, with a conspicuous black ring around the base of the first abdominal pair of spiracles. Before changing to pupa and previous to each moult, this larva is in the habit of removing these dung from its fork.”

The last of these beetles which will be noticed in this connection is

THE BLACK-LEGGED TORTOISE BEETLE.

(*Cassida nigripes* Oliv.)

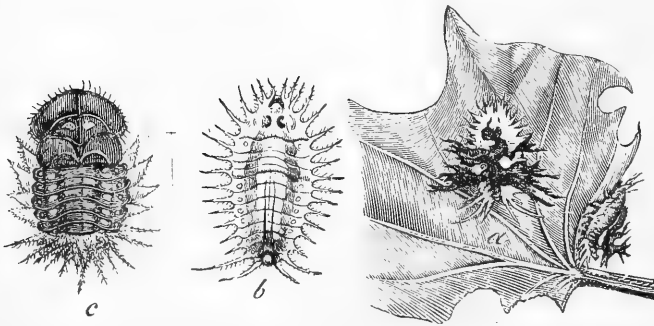


FIG. 22.—The Black-legged Tortoise Beetle (*Cassida nigripes*): a, leaf with larvæ; b, larva cleaned; c, pupa. [After Riley.]

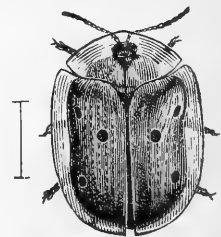


FIG. 23.—The Black-legged Tortoise. Beetle (*Cassida nigripes*). After Riley.

This insect is figured herewith in its various stages of larva, pupa and imago (Figs. 22 and 23.) In size this species slightly exceeds all of those mentioned in the present paper. It also has the power, when alive, of putting on a golden hue, but never is so brilliant as the *aurichalcea*, than which it is much larger and has the black

spots upon the wing-covers much more conspicuous and larger. Its larva (Fig. 22, *b*) is of a pale straw-color with the spines long and tipped with black, and besides has a dusky line along each side of the dorsum, as well as two dusky spots immediately behind the head and below these two larger crescent marks of the same color. "The dung is spread in a characteristic manner, extending laterally in long shreds or ramifications (Fig. 22, *a*). The pupa (Fig. 22, *c*) is dark brown, variegated with paler brown, as in the figure, while the spines around the edges are transparent and white."

REMEDIES.

These tortoise beetles are not the easiest insect enemies to handle that we have to deal with, for their mode of life, almost entirely upon the lower surface of the leaves of the plants which they infest, renders the application of remedies quite difficult. Then, too, the nature of the sweet potato vines, trailing close to the ground, adds to the difficulty. The protected larvæ also are comparatively free from insect parasites and other enemies. An early and careful watch for the beetles after transplanting will repay one for his time thus spent. London purple and Paris green sprayed upon the vines will destroy many, especially if put on with considerable force and at an angle, so as to reach as nearly as possible the lower surface of the leaves.

INSECTICIDES.

I present herewith a short paper on the different insecticides that have been found by a long series of experiments to be most effective in the destruction of the various insects with which the horticulturist and agriculturist must deal.

After having carefully studied the life histories and habits of the different insects that attack our trees, shrubs, herbs, etc., externally, we find that they all belong to either the one or the other of two classes as regards their mode of attack; *i. e.*, they either take their food solidly or else in the fluid form. The former devour the foliage, and the latter suck the sap from the leaves and bark of the smaller limbs and twigs. Therefore, in the choice of our remedies, we must take these habits into consideration. Those that devour the foliage can be killed by poisons taken into the digestive canal with the food, while such as live upon the juices of the plant only must be reached and destroyed otherwise.

Of the so-called "insecticides" and "insectifuges" there are a great many; some of which, of course, like a certain per cent of all other patent nostrums, are worthless, and should not be bought or used. There are a few of them, however, that are "genuine" and can be depended upon as being just what is claimed for them. Among these latter we can rely upon Paris green, London purple, kerosene emulsion, Persian insect powder, bisulphide of carbon, and a few of the alkali washes. None of these which I name are protected by patents, nor do they contain constituents that are unknown to the user. Besides, their comparative cheapness must go far towards recommending them for general use.

Of course, in using most of these insecticides, it is necessary to proceed with caution, for otherwise danger may result both to the operator and to stock, as well as to the tree or plant upon which they are applied.

HOW APPLIED.

The method of applying these insecticides has much to do with their efficacy upon the insects which are intended to be destroyed. It is, therefore, quite as necessary for us to choose the *best* methods of applying the poisons as it is to secure the best and most sure insecticides. A loose, careless application of the very best material will often prove an entire failure, besides a waste of material and time; whereas, if properly applied with a good force pump in the form of a fine spray the work will be all that could be desired. A very good pump for this purpose is shown in Fig. 24. It is manufactured by the Goulds

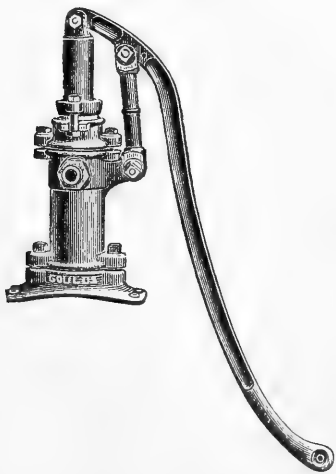


FIG. 24.— Force-pump made for applying insecticides to trees, etc.

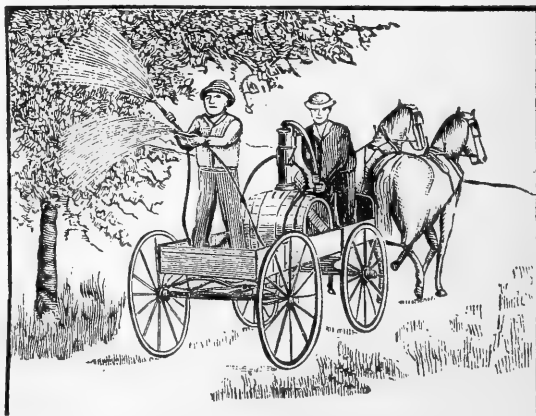


FIG. 25.— Showing use of force-pump for spraying insecticides from wagon.

Manufacturing company, of Seneca Falls, N. Y. Of course any other good pump will answer the purpose. Fig. 25 shows the use of this pump from a wagon. It will work equally well with double or single discharge pipe, or for the application of arsenical or kerosene preparations.

THE ARSENITES.

Under the name of arsenites we have two very effective insecticides. These are the London purple and Paris green of commerce. The first is an arsenite of copper, and the second an arsenite of lime. They are both preferable to the white arsenic itself for use as insecticides on account of their color, which acts as a sort of safeguard against accidents, and also from the fact that they are more readily held in suspension. The London purple, made by Hemingway's London Purple Co., of London, England, is much cheaper than the Paris green, and is just as effective in its work on the many insects for which the latter has been recommended and used. Professor A. J. Cook, in a recent bulletin, writes as follows about these two insecticides :*

"As London purple is much cheaper than Paris green, costing only fifteen cents per pound, and is just as effective in practical use, it should always be used when it can be had, unless on very tender foliage, like that of the peach, when only Paris green should be made use of. It is still a question if the arsenites should be used on the peach.

"London purple may be used either dry, mixed with land plaster—one pound of the poison to eighty or one hundred pounds of the plaster—or mixed with water—one pound to two hundred gallons of water.

"It is not the strength of the mixture, but the force and thoroughness with which it is applied, that secures success. The water mixture, which will usually be most satisfactory, should be kept well stirred, that the heavy mineral poison may not settle." He goes on and states further that London purple "*SHOULD NEVER be applied to fruit trees TILL THE BLOSSOMS FALL FROM THE TREES;*" and that it "should be applied to apple trees but once, except in case of very heavy rains, when it should be repeated two or three weeks after the first application; should be used two or three times at intervals of ten days or two weeks on the plums, and after every heavy rain; may be

* Bulletin No. 58 of the Michigan Agricultural College Experiment Station.

used to defend against the potato beetle and all leaf or bud-eating insects that defoliate our fruit trees early in the season, and on our SHADE and FOREST TREES for such insects at any time." * * *

KEROSENE EMULSION.

So far as I know, next to London purple and Paris green no other preparation equals kerosene as an insecticide. In fact, personally, I prefer the use of the kerosene to the arsenites; for, like the darkies in the cotton fields of the south, I am afraid of "pisen" under all circumstances. The *pure* kerosene is, however, just as injurious to vegetation as it is to insect life. To dilute it with water is not possible without the addition of soap or fresh milk. Either of these latter, if thoroughly mixed with a certain proportion of the oil, will render it possible to be diluted with water to such a degree that it will no longer destroy the foliage to which it is applied.

The term "kerosene emulsion" probably had its origin in the Department of Agriculture at Washington, although Professor A. J. Cook possibly was the first to use the mixture as an insecticide. He (Cook) writes about this insecticide as follows in the bulletin already quoted:

"The great value of this substance rests in the fact that it kills by contact, and insects that suck, like lice and true bugs, are killed by its use. * * * The way I prepare this kerosene and soap emulsion is as follows: I mix one quart of soft soap, or one-fourth pound of hard soap, with one or two quarts of boiling water; as soon as the soap is all dissolved, I stir in, while all is yet hot, one pint of kerosene oil. This is now violently stirred till it is permanently mixed; that is, till, upon standing, the oil will not rise to the top, but will remain incorporated with the liquid. This stirring is best done by use of a force pump—pumping back into the vessel containing the liquid. When we are ready to use this, stir in enough water to make fifteen pints in all—that is, one-fifteenth of the liquid applied would be kerosene oil."

The following formula has been used by the members of the Division of Entomology in the United States Department of Agriculture for making this emulsion, and has been found to give the best general results. It is generally known as Hubbard's formula, because first used by that gentleman in his experiments with orange insects:

"Kerosene (the common lamp oil).....	2 gallons.
"Water.....	1 gallon.
"Common washing soap.....	$\frac{1}{2}$ pound.

"Heat the solution of soap, and add it boiling hot to the kerosene. Churn or agitate the mixture by means of a force pump and spray nozzle for five or ten minutes. The emulsion, if perfect, forms a cream which thickens on cooling, and should adhere without oiliness to the surface of glass. Dilute, before using, one part of the emulsion with nine parts of cold water. The above formula gives three gallons of emulsion, and makes, when diluted, thirty gallons of wash."*

Either of these formulæ will give a wash of sufficient strength, if properly applied, to kill both the insects and their eggs; and will injure no foliage.

Professor Cook says: "Many have complained of a lack of success in the use of kerosene emulsion. In such cases, I presume the explanation lies in the manner of making the application. We must bear in mind that the lice are well concealed and protected by the thousand leaves from which they are sucking the life, and a livelihood. Often the leaves curl up and thus make the protection more sure. But we must strike every louse or insect with the liquid. We cannot then turn or sprinkle on the liquid gently, we must dash it on with force, that every insect may be struck; then there will be no complaint of ill success. Thus the kerosene emulsion should always be applied with a good force pump. It is doubtless better to throw all liquid insecticides in spraying for injurious insects; with the kerosene emulsion, it is absolutely essential to success. The kerosene emulsion is superior to any other insecticide, so far as I have experimented in destroying plant lice, scale or bark lice, many of the bugs, and not a few caterpillars, grubs and slugs."

With the above facts before him, the intelligent farmer will be able to apply these several insecticides to the destruction of a great variety of injurious insects that attack other plants than the trees growing upon his premises. Of course, bearing in mind that the *poisons should never be used* to destroy insects that work upon vegetables or other articles of food. For these latter he can resort to the kerosene emulsion and also to the

* Insects Affecting the Orange, by H. G. Hubbard, United States Department of Agriculture, Division of Entomology, 1885, p. 94.

PERSIAN INSECT POWDER,

or Pyrethrum, as it is generally called. This last named insecticide is composed of the finely pulverized flower heads and stems of a composite plant which bears some resemblance to the daisy, and is known botanically by the generic name Pyrethrum. Most of the home-made "insect powder" is the product of a California firm, and is put up for market as "Buhach." It is better to use this Buhach than to buy that of foreign make, for it loses its strength with age. Like the arsenites this may be used as a powder and dusted on the plants, but it is perhaps best to put it in water in the proportion of a heaping tablespoonful to two gallons of water. This insecticide kills by contact, and not by being eaten. It is a splendid household article that should be kept on hand for emergencies in the warfare against fleas, flies, lice, bed-bugs, etc. To be kept as fresh as possible, a tight box or bottle is absolutely necessary. For house use a small bellows is essential so that the powder can be forced into the cracks and nooks where the insects take refuge. This insect powder is also a splendid remedy against fleas upon the bodies of pets, as cats and dogs. It is also a good plan for travelers to carry some of the powder along to use in self-protection against vermin of all kinds upon the body as well as in sleeping quarters.

There are other important insecticides that are occasionally resorted to by the economic entomologist or professional "bug doctor" in his many experiments with injurious insects; but these will not receive attention at present. Perhaps, in some future bulletin we will make some mention of them in connection with the insects for the destruction of which they are best suited.

In conclusion, I wish to state that it is our intention at the Experiment Station to continue the investigation of all injurious insect forms found within the state, and therefore ask the co-operation of everyone who is willing to help in this matter. Since it is impossible for us to visit every locality in the state where insect injuries may occur from time to time, there is added, for the convenience of those who are interested, the following directions for sending insects:

All inquiries about insects, injurious or otherwise, should be accompanied by specimens, the more the better. Such specimens, if dead, should be packed in some soft material, as cotton or wool, and

inclosed in some stout tin or wooden box. They will come by mail for one cent per ounce. INSECTS SHOULD NEVER BE INCLOSED LOOSE IN THE LETTER. Whenever possible, larvæ (*i. e.*, grubs, caterpillars, maggots, etc.) should be packed alive in some tight tin box—the tighter the better, as air-holes are not needed—along with a supply of their appropriate food sufficient to last them on their journey; otherwise they generally die on the road and shrivel up. Send as full an account as possible of the habits of the insect respecting which you desire information; for example, what plant or plants it infests; whether it destroys the leaves, the buds, the twigs, or the stem; how long it has been known to you; what amount of damage it has done, etc. Such particulars are often not only of high scientific interest, but of great practical importance. PACKAGES SHOULD BE MARKED WITH THE NAME OF THE SENDER, and should be addressed to the Entomologist of the Agricultural Experiment Station, Nebraska Hall, Room 10, State University, Lincoln, Nebraska.

CANNING FRUIT AND PREPARING PICKLES FOR FAMILY USE.

BY MRS. R. N. DAY.

When I received notice from the Secretary of this Society of my appointment to read a paper here upon the above subject, I wondered what I could say that was not already known to every housewife who has the management of this department of home work. Then the thought came to me that so many say, "My fruit did not keep well this year, I think the cellar must have been too warm," or some similar reason for failure, I thought perhaps, as I am very successful, seldom losing any fruit, I might give a few hints of value to some one less fortunate. I find it quite a satisfaction to know that after the fruit is stored away it is there to stay without further trouble or care until wanted for use.

The first requisite to success is good sound fruit, canned while fresh. I always use glass jars, consider them the most economical, giving the least trouble, and am never afraid of the fruit being poisoned, as is sometimes the case where tin cans are used. I have learned that merely to can fruit so it will *keep* is not all there is to know if one would secure the best results. We are all aware that the eye has much to do with the appetite, and the more perfectly we preserve the form and color of the fruit, the surer we feel that the natural flavor is preserved. To do this it should (especially small fruit) be cooked just as little as possible, to become thoroughly heated, never adding water where it can be avoided. All berries are best placed in jars before subjecting to heat. Sprinkle sugar over strawberries, raspberries, and cherries (pitted), let stand awhile to extract juice, place berries in jar, and put the juice in a porcelain kettle with enough sugar to form syrup of desired sweetness. The jar of fruit should then be placed in a kettle with cold water enough to about half cover jar; let the water boil, keeping it covered of course, until the fruit is hot, then pour hot syrup over and seal. The covers should be filled with hot water and placed on the stove while preparing fruit and put

on the jars hot. I sometimes put the berries in the kettle of hot syrup, letting them remain until thoroughly heated, not boiled, then pour through a wide mouthed funnel that has been previously heated, being careful to have the jars *full*. The jars should be warmed before filling and a cloth wrung from hot water and wrapped around them. As soon as full screw the covers on tight. Invert the jars while hot; if they do not leak they are safe. And right here let me say, that to my mind the secret of success in the whole business lies in having every utensil used in the process *hot*. By strictly adhering to this plan one need not fear fermentation or mold.

The quantity of sugar used has nothing to do with preserving the fruit; this I have proved by canning entirely without, therefore I sweeten all kinds of fruit to suit the taste. Pears, peaches, apples, etc., are nice steamed until they can be pierced with a fork, then carefully placed in jars with hot sugar syrup poured over them; or cooked in the syrup, not putting them in until the syrup boils. Some of my neighbors say they cannot keep tomatoes in glass, but I find no difficulty whatever; when they are cooked sufficiently to can they are taken off the stove, the scum and bubbles skimmed off and treated as other fruit, being sure the jar is *full*, and if any bubbles arise skim them off. I usually use the Mason jar, but some object to it because they are so difficult to open. If a thin bladed knife is run around the jar under the rubber, the cover may easily be removed.

I have experimented a little with salicylic acid. The fruit looks very nice, but I consider it worthless for use.

All fruit after canning should be stored in a dark, cool place, and strawberries should be wrapped in paper before putting away.

Cucumbers seem to be the standard for sour pickles, and in their preparation I prefer making ready for use instead of the old way of putting them in brine. To do this, the best cider vinegar is necessary, and their value lies in keeping them crisp and green. Cut the cucumbers from the vine when about two or three inches in length, wash and place in a stone jar. Prepare a brine, using a teacup of salt to a gallon of water and pour over them while hot for three successive mornings, on the fourth morning drain off the brine, cover with a thick layer of horseradish leaves, adding green peppers, mustard seed if desired, and pour over the vinegar. Put on a weight, cover tightly and set in a cool place.

Sweet pickles I prefer to secure air tight. Make a syrup of good cider vinegar and sugar, using spices to suit the taste; if a dark color is desirable, use ground spices; if light, put spices in a little bag and boil with the syrup or put them in syrup whole. Steam apples and crab-apples until tender, put them in jars, pour hot syrup over, and seal air tight.

Cook pears in prepared syrup until tender, take out, place in bottles, boil down the syrup a little, pour over fruit and seal. Peaches will be cooked sufficiently by pouring hot syrup over them for three or four successive mornings.

There are so many recipes in the cook books and papers, good ones too, if one would adhere strictly to directions, using the best of vinegar, keeping air tight or secure from flies or insects, there need be no cause for failure.

MY FLORAL TREASURES.

BY MRS. G. J. CARPENTER.

My experience is so limited compared to the love I have for flowers that I feel almost unequal to doing the subject justice, for of all the most beautiful of God's works, who does not love them?

We place them upon the altars of our churches at Christmas and Easter as fitting emblems of the birth and resurrection of the Savior. We gather them to deck the bride, and with what fond and caressing tenderness we place them beside our dead. A home without flowers must be a barren home indeed; and if by any possibility there exists a single person who does not treasure somewhere in his heart the memory of a childhood's home around which grew flowers, however humble, that person may truly be said never to have had any childhood. How our mind reverts to the dear old home of long ago. It may have been devoid of grace and beauty, only a humble farm house among the hills, but it had rose bushes under the window and morning glories beside the door, and the dear old garden, with its poppies and marigolds and hollyhocks, was magnificent to our childish mind beyond comparison.

But a great improvement has been made in the cultivation of flow-

ers since those days. Where the old time garden could only boast of a bed of pinks, a few rose bushes and a row of bachelor buttons, we now see a large variety of annuals brightening the yard of the poor man's cottage as well as the rich man's lawn. While nearly every family cultivates flowers of some description, many do not attempt to raise annuals, thinking they require more time in their cultivation than they have to spare. It is not necessary to have a large piece of land laid out in fanciful designs, requiring the skill of a professional gardener to take care of it to raise annuals. A piece of land a few yards square will be all one person will care to tend—especially if that person be a woman, with the cares of the average housewife—not but what I would like more, for I am particularly greedy in this respect but experience has taught me a few varieties well cared for gives better satisfaction, than a larger list would if neglected.

As my acquaintance with the flora family is more particularly confined to the common varieties, I shall only speak of these. Our annuals the past season consisted of the following, viz: phlox, verbenas, mignonette, petunia, pansy, sweet alyssum, candytuft and asters. The spring was quite backward and I could not transplant the seedlings until after the first week in June, but as it was quite warm then, they soon commenced to bloom and I think we never had finer annuals, especially our bed of phlox drummondii, which was a blaze of brightness for weeks—flowers large, bright, and of twenty different shades of color.

Verbenas we had of every color, from pure white, through all the shades of pink, crimson, and scarlet, to a deep purple, almost black. My mignonette, "New Golden Queen," was a marvel for the size and fragrance of its blossoms. Petunias did finely, and were constantly in bloom from early June until frost killed them. These bloom best if the soil is not very rich, as a rich compost induces leaf growth at the expense of flowers. My pansies, I regret to say, were a failure, owing to the dry weather, and too sunny a situation. Shall try a more shady location next season, and I trust with better results.

White flowers are my favorites, therefore my candytuft and sweet alyssum amply repaid me for the little care they required, the latter being one solid mass of white bloom for months. One needs so many white flowers to use in the arrangement of bouquet vases, and baskets in the house, that it is quite impossible to get an over supply.

Last, but not least, among the annuals are the China asters. These have been a total failure with us the past two seasons, owing to a small black bug eating the leaves as soon as they are formed. Can some one tell me a preventative and method of extermination?

Next I will speak of the bulb family, they being easy of culture, and favorites with us all. My gladiolus were so beautiful last season. I cannot refrain from describing two or three. Madam Monneret, most lovely of all blossoms, very large, and a pure, pale pink. Lord Byron, vivid scarlet with white throat. Isaac Buchanan, golden yellow, faintly striped with red. Angele, a pure white. Everyone should raise gladioli. They are so little trouble, and once planted, require no further attention, excepting, perhaps, simply tying to a stick. They are certain to bloom, and give abundant satisfaction. Tuberoses have reached a high state of perfection in the past few years. By the introduction of the pearl and dwarf varieties, their season of bloom in the open ground extends from July 1 until frost, and in the whole floral kingdom there is nothing surpasses them for beauty of flower, or delightful fragrance.

As soon as Jack Frost has destroyed our "out-door treasures" we should turn our attention to the "Dutch bulbs," hyacinths, narcissus, crocus, tulip, and snow drops. There are few things that will create more admiration, and add more to the beauty of a house during the dull months of winter than a quantity of well managed bulbs, and by giving a little attention to the potting of these already named, one may have a succession of beautiful flowers from December until May. But we must stop somewhere, and though our list is not exhausted, I fear your patience is, therefore I will defer the description of my other treasures among the perennials and house plants until some future time. I only wish I could have imparted a fractional part of the pleasure I have received from the cultivation of the few mentioned.

HOME ADORNMENTS.

BY MISS EMILY JONES.

What a wide field does this topic open out before us, and one too that we can enter upon without being as daintily shod as the extravagant minded may suppose.

The housewife whose cosy surroundings testify that they owe their main attractiveness in great part to her own taste wins more appreciation than she does who has the golden passport into the realms of professional decoration.

One can tell at a glance the house that has been furnished "to-order." It is strictly correct, but it lacks the dainty finishing touches that are not purchasable.

It is not the rich alone nowadays who can have their tables sparkle with glass, their mantel and brackets filled with ornaments.

Take, for example, the pressed glassware. Especially in table glass, are the pressed wares to be recommended; the fruit bowls, olive dishes tumblers and goblets are beautiful, to say nothing of the slender, dainty pitchers that temper the blue-whiteness of the city milk until one almost thinks it is rich Jersey cream.

There is a growing fancy for light toned walls and ceilings, and it is a fact to be noted that many of the less expensive wall papers are more chaste and prettier in pattern than those of higher price. The prevailing tints are robin egg blue, soft terra cotta, cream and pale olive. In papering a room the size and location should be taken into consideration, a north room will require the rich warmer tint than an eastern or sunny south could do without, and all heavy shades should be near the floor so as to blend and grow soft and light near the ceiling.

Then our lamps should not be a second consideration. If we have a hanging lamp over the center table we should have on mantel or bracket a table lamp. Let the rooms be well lighted in the evening.

In the dining room we should not have any table ornaments so high as to interfere with the view across the table.

The linen closet is always near the good housewife's heart and her

needle work plays a prominent part. Work bags for various kinds of work are made so easily now with unbleached linen. Worked with some pretty design, dust bags, pretty mats, and rugs can be made but with little expense. Cushions are always pretty and several in a room add to its beauty and comfort.

Rich looking curtains are made by outlining the pattern woven in Nottingham lace, and if the colors used correspond with those of the room the effect is striking and beautiful.

Bed-spreads are now ornamented a great deal. Quilts of bolting sheeting, stamped with all-over design and worked with rope linen floss, are very pretty. Crochet and knitted quilts are very handsome, and are not the work that many think, for it makes good pick-up work when one is too tired to do embroidery and finer work.

A pretty table cloth may be made with heavy butcher's linen, worked with a pretty design with linen floss. This is a durable cover also.

And last but not least are our flowers in mid-winter. There are few homes where a number of plants may not be found. Among the free-blooming plants we have the geranium, fuchsias, petunias, and begonias; then there are the hyacinths and crocus, and the flowers from one bulb will brighten a room for weeks.

Never arrange the plants in your window with a view to make them attractive from the outside; arrange them for the pleasure and comfort of the home, the passer by can satisfy himself with a look at the garden, or with a visit to the greenhouse. Nothing is prettier than a thrifty plant making the center piece of the dining table. Let your plants be scattered around the room in the evening; give them the place of honor. And to the bright and pretty adornments the beautiful flowers add a bright face, a welcome smile, and home, if ever so humble, will be a place of beauty and a joy forever.

HOW CAN THE PRESS AID THE HORTICULTURIST?

BY H. E. HEATH.

Had your speaker been assigned the topic, "*How Can the Horticulturist Aid the Press?*" it is probable that he could have discussed it more to his satisfaction. But the question as it stands most certainly admits of some discussion which may be of advantage to your Society.

The press is the most potent factor in modern civilization. Its force and power are felt by every citizen of every country within the confines of civilization. The modern enlightenment of mankind is largely due to the educating influence of the press, which makes the acquisition of information comparatively an unimportant matter to what it once was. The transition of the world's civilization from the midnight reign of superstition called the dark ages, the revival of learning which has culminated in the magnificent school systems of Germany and America, and the passing away of the old spirit of intolerance, is largely due to the influence of the printing press. From the charnel house of ignorance man has been rescued by the press. Thrones have crumpled beneath the iconoclastic touch of this stern warrior, and upon their ruins have been erected governments for the people, of the people, and by the people.

This force which has been so potent in the world's history is an aid to aggressive development of man, or of ideas into higher types. The politician's rancor and corruption is held in check by a fear of it, and to it the mass of the people look for enlightenment. In religious affairs its importance has ever been conceded, and no religious society considers its paraphernalia complete without adequate provisions for the publication of books and papers in the interest of its peculiar tenets. To the press the scientist looks to disseminate information among the people, for had he to wait for the slow education of the people in schools, generations would pass away in worthless inactivity.

The press is the mighty educator of the people. The great current of human thought flows through these arteries and is diffused through

the body politic. Our knowledge of current events, of men, and of character, we do not get from schools, but from the press. Even our knowledge of countries and places is gleaned more from the papers of the day than from the musty geographies of our boyhood which placed what is now the fertile state in which we live upon the map as the "Great American Desert."

This is not the only myth of the past which the press has banished. The progress in agriculture is quite largely due to that potent power, although the agriculturists, with their kindred pursuits, are most negligent in reading and practicing the lore of the press devoted to their interests. Yet, I fancy, that while the horticulturist has been planting and hybridizing and grafting, developing and experimenting, the agricultural press has been his most efficient ally in giving the results of his labors to the world, and not only this, but the demand for your labors is largely created by the same press, which ever seeks to introduce everything which will tend to better the condition of the farmer.

I realize fully the importance of your chosen field of labor. The treeless prairies of Nebraska must be clad in living green by your hands, and the fruitless farms must be made to bring forth the "vine and fig tree." Yet the only way the farmer can be led to properly appreciate the value of such development to him, is by constant education and having his attention called to it often by a disinterested medium, for he is apt to think you urge this upon him because you are in the business. Such a medium of education can be found only in the agricultural press, which goes before and prepares the way of the horticulturist.

In the furtherance of this work the press needs the co-operation of the horticulturists, singly and in a body. Items of information which continually arise from your labors should be given to the people, and thus a continual interest be kept up in your work. The publisher in the hurry and rush of his business can scarcely spare time to recall the days when he, too, was an enthusiastic investigator and gave the knowledge thus acquired to an admiring world as the result of his investigation. True enough such investigations were of great interest to him, and it was a time of ceaseless activity when on the way home from school he and his congenial chums crept through the hedge, or scaled the lofty picket fence to find the ripe peaches and bear them

off in triumph. And if I had time to recall such scenes, I doubt if you would feel the same thrilling interest which I felt in the wild, mad race for the fence while the dog at every jump amputated portions of my home-made jeans and caressed with his teeth the fleshy portions of my anatomy. How eagerly we investigated the mechanism of the early matured apple, which was almost as large as a quail's egg, and with what ardor it yielded up the condensed cholera-morbus and grip. How we turned the strawberry leaves over hunting for a berry which was turning white. But these days of investigation are long past and we must look to you to convey to the people the results of your labor in the more sober but not less earnest walks of life.

Competition is so keen that even if the publisher owned a "vine or fig tree" he would have no time to sit under it and plan to develop it into a better variety; and then we cannot be expected to be as experienced in all the lines of horticulture as the men who are spending every energy in that line. So I believe that for the press to properly aid the horticulturist it is necessary that he should do all he can toward furnishing useful and educating information to the masses of the people. The press is only too glad to give such information the greatest publicity, for we live to make the farmer a power in the land and in every way to advance his interests. To this extent the only weekly agricultural paper in the state, *The Nebraska Farmer*, especially offers its columns for your use, as do all first class journals.

Information in this line should be made accessible to the people that they may take an interest in their own welfare. Such facts as the most adaptable fruits for Nebraska, best and most profitable mode of cultivation for plants and trees, preservation and care of fruit, etc., are of interest to every farmer, and the more interest the press can awaken in such things the greater the advantage to the farmer and the horticulturist as well.

Your business is most intimately linked with the welfare of the state. It is a grand work to bestud the rolling prairies with groves and orchards. It will add to the good health, comfort, and prosperity of the state more than almost any other line of farm development. In your grand work the press bids you Godspeed, and hopes that your association may attain the very highest pinnacle of success. It is certain that the press can be as great a help to the horticulturist as it has been to men in other walks of life, and as we look upon your work

as so great before you in Nebraska, we are only too glad if we can aid you in any way.

All mankind have appreciated fruit and will continue so to do. From the day when Eve got into trouble by taking an apple which did not belong to her, up to the present, fruit has been a great staple of the world. This is recognized so well that even the Bible adopts the language of the horticulturist and says, "Comfort me with apples," and prophesies of the days when your Society shall redeem Nebraska from a wilderness to this extent, "In place of this bramble shall spring up the fig tree." And it must be that horticulture is one of the most successful pursuits in heaven, for do we not read of gardens of amaranth, etc.? And doesn't it speak of the tree of life which has twelve kinds of fruit?

This being the case I shall close the discussion. If all good horticulturists go to heaven you have the Bible on your side, and as I have already shown that you have the agricultural press as your aids, why should you not prosper and be happy?

DISCUSSION.

BROWN—I don't believe the editor has got over his youthful longing for apples yet; I noticed when he was at our place he had a very pushing way of investigating if there were any apples in the trees as we were passing through the orchard.

POTATOES.

BY JARED G. SMITH.

Potatoes rank third among the food products of the United States. They are as much a staple as corn, wheat, or oats. They form the chief fat-producing food of a considerable part of the human race.

Solanum tuberosum, the potato of the gardens, is a native of America from Mexico to Chili, and a variety, *borealis*, grows as far north as New Mexico.

The potato was first introduced into Spain over three centuries ago, and in 1586, by Sir Walter Raleigh, into England. It did not pass

into general use till a hundred years later. Now it is grown in almost every country on the globe.

The tubers of the wild plants range from a half inch to an inch in diameter. The larger varieties known to commerce are obtained from these by careful cultivation and selection of seed. Old varieties run their course and give way to the newer ones. What was the general favorite twenty years ago is to-day forgotten, and the best potatoes of to-day will be replaced with the better ones of tomorrow. While preparing this article I found a small book on potatoes, written in 1870, and of the twenty or more kinds described and discussed not one appears in the prize lists of to-day. They have all, as the saying is, "run out." They have degenerated in that short time, and are no longer profitable to raise.

The demand for varieties to grow for market or for home use is that they shall be of good quality, fine grained, regular shape, with smooth skin and shallow eyes, and that they shall be not only large, but productive. A potato having all these characteristics would rank A 1. Many have one or more of these points in their favor, but few combine them all; and it is to find out and put forward just what ones are the best that experiments have been carried on at the station for the past two years.

During 1888, 176 named strains were planted, and in 1889, 169. Of these 169 only 64, about one-third, possessed the most essential point—productiveness, and only 20 of these 64 were what might be called prolific. These twenty kinds were tested by cooking in as nearly a uniform manner as possible, and the results, with descriptions of each I give as follows:

No. 1. *Pierson's Eureka*, estimated yield 360 bushels per acre, is an oblong, knotty, rough looking pear-shaped potato, with smooth skin and deep set eyes. The "seed" end is the largest. Both ends are evenly rounded. Four potatoes weighing 2.2 pounds cooked in thirty-nine minutes; were fine grained and mealy, and seemed of good quality, although the largest tubers are often hollow.

No. 2. *Bonanza White*, estimated yield 310 bushels, is a rough, much branched tuber, with deep eyes. Six small ones cooked in thirty-seven minutes. All the potatoes were hollow, and though mealy, of poor quality. This is a poor kind to raise for market because of the large amount of waste.

No. 3. *Column's Superb*, estimated yield 273 bushels per acre, is a long slender, dumb-bell shaped tuber, round or nearly so, in cross sections. The stem end is smallest and rather acute, seed end obtuse, skin light colored, and eyes few and shallow. Six medium tubers cooked in twenty-seven minutes. The cooked potato is of good quality and flavor, close grained and snow white.

No. 4. *Cusco*, is a white, smooth skinned, much branched potato, with medium eyes. The tubers are very irregular in size and shape. The estimated yield was 272 bushels per acre of marketable potatoes. Six medium ones cooked in thirty-three minutes. They were white, fine grained and mealy, cooking to pieces readily.

No. 5. *Calico Victor*, is large, quite uniformly shaped, oblong, white, blotched with blue, with abruptly rounded ends and shallow eyes. Five large tubers cooked in forty-three minutes. They were white, very solid, not very mealy, and of good flavor. Nearly all the tubers were scabby. The estimated yield was 264 bushels per acre.

No. 6. *Parson's Prolific*, estimated yield 264 bushels per acre, is a rough skinned, flattened cylindrical potato with abruptly rounded ends. It inclines to branch and is then very irregular in shape. The eyes are few and shallow. Five large tubers cooked in thirty-nine minutes. They cooked well and were quite mealy.

No. 7. *Scotch Bruffin*, estimated yield 259 bushels per acre, is a very large, flattened, egg-shaped potato, inclining to assume an irregular branched form, with an uneven surface, smooth skin, and deep eyes. The stem end is abruptly rounded. Four large tubers cooked in thirty-four minutes. They were rather watery, and were coarse grained and only of fair quality.

No. 8. *Delaware*, estimated yield 249 bushel per acre, is a smooth, medium sized, flattened, oval or pear-shaped potato with shallow eyes. The seed end is the largest. Seven medium tubers cooked in twenty-seven minutes. They cracked open in cooking and were mealy and of good quality.

No. 9. *Great Eastern*, estimated yield 237 bushels per acre, is large, irregular ovoid, with the stem end abruptly flattened and compressed and the seed end evenly rounded and slightly compressed. The eyes are few, and of medium depth. Six small tubers cooked in thirty-five minutes. They were watery, coarse grained, and of poor quality.

No 10. *Iron Clad*, estimated yield 232 bushels per acre, is large

rounded or elliptical, with smooth skin and eyes of medium depth. All were quite scabby. Six medium ones cooked in thirty-seven minutes. They were watery, coarse grained, and of poor quality.

No. 11. *Jordan's Russett*, is a smooth skinned, irregular branched potato. Three medium tubers cooked in thirty-four minutes. They were mealy and of fair quality. Estimated yield 223 bushels per acre.

No. 12. *Rural New Yorker No 2*, estimated yield 211 bushels per acre, is a smooth, rather regularly oblong potato, elliptical in cross section, ends evenly rounded, and eyes few and not very deep. Six medium tubers cooked in thirty minutes. They were of fine quality, very mealy. They are one of the most promising varieties that has lately come upon the market.

No. 13. *Hollis' Silverskin*, yield 208 bushels per acre, is a long, slim, dumb-bell shaped, with smooth skin and shallow eyes. They are bent at the middle. The stem end is acute, and the seed end evenly rounded. Six medium tubers cooked in thirty-one minutes. They were mealy and of good quality.

No. 14. *Irish White Rock*, estimated yield 207 bushels per acre, is a uniform, smooth, oblong potato, elliptical in cross section, with few eyes of medium depth, and evenly rounded ends, the stem end the largest. Four medium tubers cooked in thirty-eight minutes. They were watery and cross grained, of poor quality.

No. 15. *Jones' Prizetaker*, yield 203 bushels per acre, is a long, slim, branching potato, elliptical in cross section, the skin russet brown, eyes numerous and deep, both ends evenly rounded. Four medium tubers cooked in thirty-six minutes. They were mealy and of very good quality.

No. 16. *Magnum Bonum*, yield 194 bushels per acre, is a large, irregularly oblong potato, broadly elliptical in cross section, seed end small and evenly rounded, eyes medium shallow, skin dark colored. Five medium tubers cooked in thirty-two minutes. They were of fair quality, quite mealy.

No. 17. *Storr's Seedling*, estimated yield 187 bushels per acre, is a very fine appearing potato, regularly oblong, ends evenly rounded, eyes deep. The larger tubers were hollow. Three large ones cooked in forty minutes. They were coarse grained, rather watery.

No. 18. *Wide Awake*, estimated yield 183 bushels per acre, is a potato of medium size and fair quality.

No. 19. *Magnum Pinkeye*, estimated yield 182 bushels per acre, is an irregular, branched potato, with large, not very deep eyes that are sometimes pink, and a smooth skin. The tubers were mostly hollow. Five large ones cooked in thirty-six minutes. They were watery, coarse grained, and of poor quality.

No. 20. *Rural Blush*, estimated yield 180 bushels per acre, is a long, broad potato with uneven surface, large, deep eyes, and abruptly rounded or flattened ends. Tubers mostly hollow. Flesh, pink tinted around the eyes. Three large ones cooked in forty-three minutes. They were mealy, and of good quality. The plant is a strong grower, remaining green till killed by frost. The tubers are very fine looking, nearly all marketable.

Besides these there were a couple of seedlings that were very promising. Both are of the peachblow type. They are:

No. 21. *Perfect Peachblow*, estimated yield 128 bushels per acre, is medium sized, flattened, oval, with smooth skin, and shallow pink eyes, so few in number as to be *almost eyeless*. The ends are abruptly flattened so as to make the outline almost rectangular. Six medium potatoes cooked in thirty-four minutes. The flesh is yellowish, cooks mealy, and is of fine quality.

No. 22. *Spanish Marx*, estimated yield, seventy-eight bushels per acre, is an elongated, flattened, oval potato. The skin is pink or light red, blotched and banded with white. The ends are evenly rounded and the eyes are numerous and deep. Four large tubers cooked in forty-three minutes. When cooked they were bright yellowish, of fairly good quality. They are very fine looking, and though quite late, are worthy of a more extended trial. They were tried in Custer county by Mr. E. S. Spooner, near Sargent. He reports a yield of fifteen and one-fourth pounds from ten hills, which is better than we had at the station. They were also tried by Mr. Hermance, of Lancaster county, and he reports very favorably as regards both quality and yield.

The best cooking potatoes of those tried were:—

Rural New Yorker No. 2, Delaware, Pierson's Eureka, and Jones' Prizetaker.

As I said before, potatoes to be salable must be of good quality, look well and yield well. A man may successfully dispose of a crop of large, smooth, coarse grained, and watery potatoes one year, but

the second year he will have to seek other customers or claim that he has a new variety. Potatoes, like almost everything else, grow best on good soil. The very best varieties may be "run down." A fine grained, mealy potato will soon become a coarse grained, watery one, if planted a few years on poor, unsuitable soil. Potatoes take potash and phosphoric acid out of the ground, and also nitrogen and lime in smaller quantities. They must have potash or they will starve, and potash is not supplied by stable manure, or bones, or other nitrogenous fertilizers, such as are most commonly used by western farmers. What your potatoes want is humus—decaying vegetable matter, green manures, wood ashes, or potash salts. Feed your potato field well, and the potato field will in turn feed you. It does not cost one cent more to cultivate a rich soil full of the right kind of plant-food than it does to cultivate a poor, barren, sterile field that has had all the available plant-food taken out of it, and the results are so much better. It is better to take 400 bushels of potatoes out of a field than it is to raise 100 bushels. A man's back will not ache so much digging the 400 bushels as it will digging 100, particularly if the man owns the field. Fertilizers cost something. It takes time to put them in the ground properly. Some farmers argue that Nebraska soil is rich enough. Experience in the eastern states, in Illinois, Indiana, and Ohio, where the land was once prairie, has proved that a man cannot go on taking from the soil forever without putting anything into it. A poor farm is just like a poor horse, or a lean cow; it cannot do as much, produce as much as the rich farm, or the well-conditioned animal. No sensible man expects a half starved horse to pull as hard as a strong, healthy, well-fed one, but when it comes to the question of rich land or poor land, many a man says "It is too expensive to fertilize; no, it costs too much. My farm is rich enough."

The best soil for potatoes, or in fact for any root crop, is light, sandy loam, well cultivated and well drained, and thoroughly filled with decayed vegetable matter. In the older states where they can be obtained forest leaves or swamp muck are much used. These being unattainable here, the best preparation would be to turn under a field of growing clover, vetches, rye, or any other green crop.

As to methods of cultivation some prefer hilling or ridging the potatoes, while others prefer deep planting and level cultivation. Results of experiments at the Michigan station indicate that the latter method

is the best. Fewer potatoes are sunburned, and they do not suffer as badly from the drouth if the ground is kept level.

Experiments as to the best method of cutting potatoes have been made at a number of the stations. At the Vermont station the best results with ordinary cultivation were obtained from planting whole, medium sized tubers with the sprouts rubbed off. The results were nearly as good as when halves of the seed ends of medium tubers were planted. As between the seed end, middle and stem end the balance was in favor of the seed end.

The best results of all were obtained by planting one medium potato in a hill. When the plants were four inches high the hills were mulched with six inches of fine hay. This mulching keeps down all weeds, retains the moisture in the ground and maintains a very even temperature, allowing the growing tubers to attain the largest size.

All authorities agree that the ground should not be stirred after the tubers have commenced to form, for whenever this is done, new ones will appear and will take a portion of the food that would have been stored in the older ones. It is more advantageous to have a few large, ripe, well formed tubers in a hill than a larger number of medium and small ones.

At the Ohio station an experiment was made in 1888 to see what effect, if any, drying of the seed after cutting had on the productiveness. Seed was planted on the same day that it was cut, and other seed was also planted that had been cut five, nine, and twelve days. Taking the crop from the freshly cut seed as the standard: the seed that had been cut five days yielded in some cases more and in some less; that which had been cut nine days yielded more; and the twelve day cuttings yielded less. In other words, their experiment indicated that an increased yield may be obtained in planting seed that has been cut from five to nine or ten days. The probable cause of this is that the drying prevents rot.

The theory is sometimes advanced that better results will be obtained by cutting out all but two or three eyes from the tuber than by planting it whole. That statement is sometimes made in books. Results obtained at the New York Experiment Station show that the idea is false. The young growing plant depends on the seed for its nourishment only a very short time, and in the majority of cases not

all the stored up starch is used. A number of the young plants were detached from the seed three weeks after planting. There was no marked difference in the yield of these compared with that of plants which were allowed to remain attached.

Nearly all of those who have investigated the subject of potato planting have come to the conclusion that the larger the quantity of seed planted the greater the corresponding crop.

Botanically the tuber is not a seed, but is part of an underground stem. The center or more watery portion is the pith. The cambium layer, or the portion from which all increase in diameter takes place, is noticeable as the dark line, seen when you cut a potato in two, just beneath the skin. The skin or epidermis is composed of a thin layer of cork cells. The minute wart-like bodies called lenticels that are scattered over the surface are the breathing holes where air and water pass through into the inner tissues. The eyes, as we call them, are buds. The seed end is only a much dwarfed leaf shoot. The small rudimentary hood that covers the eye, occurring rarely, is the rudimentary leaf whose axil is occupied by the bud. The problems that arise in planting potatoes and in experimenting with them are those of grafts and cuttings rather than of seed. Two kinds of potatoes planted in one hill will not mix or cross any more than two grape vines will if set side by side. Cuttings from either vine will transmit the characteristics of the individual from which they came. Changes in the fruits must be made by cross-fertilization of the flowers or by grafting. With potatoes grafting is not practicable and cross-fertilization is depended on for the production of new varieties. Varieties are being originated in all parts of the country, but only a few of all put forth ever amount to anything.

The amount of starch in a potato averages from twelve to twenty per cent. It varies greatly in the different varieties, being somewhat more in seedlings than in those that have been cultivated a number of years. This tendency of cultivation is not, however, a fully established rule, for with this plant, as with most others, an improvement can be made by careful selection of seed. There is some evidence that the best potato from the best hill yields better than the best potato from the poorest, and also better than the poorest tuber from the best hill. It seems to me that it would pay a farmer to select his potatoes just as well as to select the best corn or the best vegetables for seed

Good cultivation and good ground are not the only essentials for a good yield. There must be good seed as well.

Smooth potatoes are preferable to irregular branched ones, or to those having deep eyes, because less is lost in preparing them for food. The starch grains seem to be most numerous in the cells next the epidermis, and in taking thick parings, as is necessary when the tubers are rough and irregular, too much of the nutriment is lost.

DISCUSSION.

DAY—I much prefer 100 bushels to the acre to 400, if prices remain as they are now. How do you cut your potatoes?

SMITH—We plant one eye to a piece, one foot apart in the row; we use large potatoes for seed.

CARPENTER—I raise 400 to 600 bushels per acre at my farm; this year I used seed from Pennsylvania—Early Ohio and O. K. Mammoth. Plant in bottom of deep furrow fourteen inches apart, rows four feet.

PROFESSOR HICKS—Those potato stories put me in mind of some big fish stories. From Colorado come reports of 800 to 1,500 bushels per acre, but these cannot be true, as the American agriculturist prize potato crop this last year was only 700 bushels to one measured acre.

WOULD THE ESTABLISHMENT OF EXPERIMENT STATIONS BE A BENEFIT TO OUR STATE?

PRESIDENT—We must now take up the subject of experiment stations. Mr. Brown, what have you to say on the subject?

BROWN—I am not well enough posted to say very much concerning this subject, but I think horticultural experiment stations can do a vast amount of good if conducted properly. At present we ought to have, and I think could get along with about three stations, one in the northwest, one in the southwest, and one in the extreme western part of the state. Here in the eastern part we have many varieties that have been amply tested and proven to be good, but in the sections I have named, nothing, or comparatively nothing, has been tried, and the people are generally too poor to waste money in experimenting;

therefore, a station in each of these districts would prove a great blessing.

CARPENTER—I agree with Mr. Brown in regard to the location, and would say further that we have plenty of private individuals in eastern and southeastern Nebraska who are experimenting on a large scale. On our own grounds we are testing 300 to 600 varieties of new fruits yearly. We have all the Russian cherries and a great many of the Russian plums, and undoubtedly some of them will prove acquisitions worthy of general cultivation. I notice amongst the Russians a sweet cherry that stands our winters admirably — something that none of our common sweet cherries do, and if it proves of good bearing qualities is bound to be a success.

REED—I think that we should take right hold of this and get stations started as soon as possible.

DAY—The Hatch bill gives each state \$15,000 to bear the expenses of experiment stations, but it seems strange that eastern states should get as much as we, when they have so many tested varieties of everything, and here agriculture is comparatively new.

CARPENTER—Day overlooks the fact that there is policy in some things, and this bill is one of them; in order to give us some money for experimental work they had to give the eastern states some too. But the Hatch bill is not for horticulture alone, and I don't think we should pull too hard until we get fairly started.

STEPHENS—Professor Bessey has a subject to present that will interest all of us and I would like to hear from him.

BESSEY—I asked Day if it would be a good plan to join the horticultural experiment stations to the state experiment station and he thought it would. The regents think it a good plan to have sub-stations and we can attach these horticultural stations as such. Now if you can do this work for \$500 per year, and if you were to present your plans to the regents, I think they would accept. We can't get anyone to do anything for us without big pay. If you have good men who can take charge of such work I think there will be no trouble to establish the sub-stations. You furnish the men and we will furnish the money. You, as members of the society, can designate lines of work we could not.

STEPHENS—Have we a committee?

PRESIDENT—Youngers, Stephens, and Taylor were the committee

on experiment stations last year and no new one has been appointed. I studied hard on the subject for a long time and was taken down sick ; after I got better I heard from Carpenter who said we could not do it, that the law would not allow us to use this money for anything but premiums.

STEPHENS—When the state asks a man to take charge of anything he at once expects big pay ; but horticulturists are whole souled fellows and if a portion of the expenses can be furnished I think we can get the men. I move that a committee composed of the secretary, the treasurer, and myself be appointed as committee to confer with the regents of the state university in regard to this experiment station business.

DAY—I second the motion.

The President put the motion, which carried.

BESSEY—Your committee should come prepared, fully, with all details so that we can account to the United States treasurer for all moneys expended ; you will need to have all this worked out. It is impossible for us to check out to you \$500 without a definite arrangement and plan showing for what purpose each payment is made ; everything must be complete so we can fully account for every dollar.

STEPHENS—Let us get together this evening at the hotel and arrange our plans in detail.

BESSEY—The regents' meeting is always in December and I will see that you are notified of the time.

DISCUSSIONS.

PRESIDENT TAYLOR—It is quite a while yet till the World's Fair, but we must begin to lay our plans now, so when the time does come we shall not be found like the foolish virgins, without oil in our lamps. There is to be a convention called shortly to meet in Chicago for the purpose of electing eight men to act as commissioners of horticulture and upon these men will devolve the duties of looking after the horticultural interests of the United States. We need to appoint one or two delegates to this convention and nominations will now be in order.

HARRISON—I move that in all such matters pertaining to this society we have our president and secretary represent us.

BESSEY—I think the motion a good one, and most heartily second it.

YOUNGERS—You have all heard the motion ; as many as are in favor of it signify by saying aye.

The motion prevails.

CARPENTER—I think it would be a good plan to have a different legislative committee to lobby in the legislature this year. There is quite a good deal of alliance and labor movement in different parts of the state and it might be wise to meet any unforeseen event by having one of that party on our legislative committee.

DAY—There is no politics involved in this matter ; it is of a different character, and I am in favor of retaining the old committee if I am not one of them.

BELTZER—It makes me feel good to see Brother Carpenter take a step in this direction. I feel assured of our success.

HARRISON—No party should ever enter here [applause] ; we are not a political organization, but our sole object is for the advancement of horticulture ; and although we need a legislative committee to urge the passage of a bill giving us a larger appropriation, we do not need to discuss the political situation in our meetings here.

BARNARD—Is there a standing committee ?

PRESIDENT—Yes, there is.

CARPENTER—This is a good time to do some horticultural work when we are asked for our vote. We have a little appropriation, but we can't do much with it, as it is restricted so much ; we can use it for paying premiums only and hence we cannot branch out at all. If we can get a little money to do experimental work I am satisfied we can do a great deal of good.

BESSEY—This committee should put in concise form on a slip of paper what we want ; we ought to know just what to ask for. As for myself I am afraid I could not tell readily what we really do want and I think the majority of our members feel the same ; but if we had a slip of paper setting forth our wishes we would know what to do when a candidate canvasses us.

CARPENTER—The law says we shall use the present appropriation

in paying premiums and that only. When we established experiment stations last winter I consulted a lawyer and he said we could not use the money except for premiums.

BESSEY—Then we wish to have a bill amending the present law so we can use this money as we please.

PRESIDENT—Our present law is defective. As it now is, each bill is for two years only and each legislature has to pass a bill for the next two years. Five thousand dollars is little enough and we can get it if we can make up our minds.

YOUNGERS—Would it do any good if we could get a bill passed so we can use the \$2,000 as we please? I think we could do much good with that amount if we did not have to pay it all out in premiums.

FRUIT, FOREST, AND ORNAMENTAL TREES, SMALL FRUITS, ETC.

DESCRIPTION.

APPLES—SUMMER.

Carolina Red June.—Tree hardy, upright, early bearer, shoots slender, foliage dark, color red, almost black in sun, fruit medium, form variable, surface smooth, with minute dots. South and middle.

Red Astrachan.—Is of Russian origin, and has proven itself a great favorite, especially in the north, by its hardiness and good cooking quality. Tree vigorous, upright; foliage large, rich, green; fruit medium to large; surface smooth; color, striped crimson; season July. Recommended for general planting.

Duchess of Oldenburg.—Tree rather poor in nursery, but has proven one of the best for the north. Fruit large, surface smooth, waxen yellow ground, covered with bright carmine stripes, sour; one of the very best for cooking; very productive. Can be relied on in any part of the state.

Cooper's Early White.—Tree spreading, stocky growth, makes a beautiful tree; fruit medium to large, flavor acid, good regular bearer; color white with dim markings of green around the stem. August and September. Recommended for general cultivation.

American Summer Pearmain.—Tree slow grower in nursery, but makes a fine tree; fruit medium, dull purplish red, with distinct stripes of bright red or carmine, flavor mild or sub-acid, aromatic, quality the best; season, July and August. Better for the southern part of the state.

Cole's Quince.—Tree upright and hardy, leaves resembling the quince when small; profuse bearer; apple large, smooth, bright yellow, acid, good for cooking. Recommended for any part of the state.

Sops of Wine.—Tree vigorous and spreading, productive; fruit medium, surface smooth; mixed red, with shading of dark red, dots

small, scattering yellow; quality good; extra dessert apple; season August.

Sweet June.—Tree one of the best, upright and vigorous, regular bearer, and productive; fruit sweet, medium sized, excellent for baking; season June and July.

Summer Queen.—Tree vigorous, large, spreading, productive; fruit medium; surface yellow, covered mixed red, splashed scarlet; flavor good, aromatic; season August; use kitchen. Recommended for the northern and middle part of the state.

APPLES—AUTUMN.

Snow Apple.—Tree fairly vigorous, foliage abundant; fruit medium, round, regular surface, nearly deep red, made up of stripes and splashes that are nearly lost in depth of color, flesh snowy white, very tender, juicy, flavor sub-acid, quality good; season September, but may be kept much longer. General planting.

Wealthy.—Originated in Minnesota. Tree hardy and vigorous, recommended for the whole state; fruit medium, red or nearly so, flesh fine grained, often with red streaks, sub-acid; season in Nebraska, September to November.

Dyer.—A popular dessert apple. Tree a moderate grower; fruit medium size, greenish yellow with a faint blush upon one side, flesh white, tender, juicy, flavor mild sub-acid; season September. Central Nebraska.

Fall Winesap.—Tree a fine, clean grower, spreading and drooping by age; early bearer; fruit medium, yellowish green with considerable blush in the sun, flesh whitish, fine grained, tender, sub-acid; season September. Recommended for the southern part of Nebraska.

Calvert.—Tree a very fine grower, very hardy and productive; fruit large, rather flat, greenish yellow, striped in the sun with dull red stripes, quality fair, good for cooking; September and October. General planting.

Utter.—A popular apple where grown; tree regular bearer, and perfectly hardy; fruit medium, yellow ground, mottled and shaded with red, flavor sub-acid, tender and juicy, good; October and November.

Plumb Cider.—Recommended for trial; tree hardy, and fair grower; fruit medium, yellow, striped with carmine, flavor acid, good for dessert; rather small for market.

Day Apple.—Introduced into Northern Nebraska from Maine ; tree very hardy ; apple medium to large, yellowish green, quality good. Recommended for trial throughout the state.

Maiden Blush.—Medium size, flat, quite smooth and fair, pale yellow, with beautiful red cheek ; tender, sprightly, pleasant acid flavor ; vigorous grower and good bearer. August and September.

APPLES—WINTER.

Ben Davis.—Tree one of the very best, not strictly hardy in the North, good bearer, best for market ; fruit large, highly colored, and tempting, quality scarcely the best ; probably the most profitable apple for Middle and Southern Nebraska.

Jonathan.—Beautiful tree, good grower ; fruit full medium, fair producer, color dark red, shaded to almost black in the sun, fruit drops in a dry season ; November and December, but can be kept until April.

Geneton, or Rawle's Janet.—Old and favorably known variety ; tree fairly vigorous, bears young, and if not allowed to overbear, fruit medium to small ; quality not the best, but good keeper ; blooms very late, thus never killed in bloom by late frosts.

Missouri Pippin.—Tree resembling a seedling, good grower, foliage dense, fruit early, very productive ; fruit medium, surface smooth, shaded, mixed striped red ; flavor sub-acid, very good ; season December to March. Worthy general cultivation.

Winter Wine.—Tree very large and handsome, spreading head ; fruit large, surface smooth, yellow, covered with splashes of crimson, flesh yellow, firm, and juicy, quality good ; season November to January.

Otoe.—A native of Nebraska ; tree of rather the wild order, improves by age, productive, and early bearer, fruit medium ; color, carmine, splashed with darker lines of red, quality good ; been a success wherever planted ; season December to March.

Iowa Blush.—Tree upright, hardy, and very productive ; fruit small to medium, waxy yellow with blush of carmine in the sun, quality good, fruit rather small for market ; season December to April. Recommended to general planting.

Walbridge.—Tree very hardy, and one of the finest ; fruit medium to large, yellow with lines and splashes of carmine, quality fair, acid,

good for cooking, and good keeper; new, and promising for general planting. January to May.

Winesap.—Too well known to require a description. Tree hardy almost wherever planted, early bearer, and profitable; tree inclined to overbear, causing fruit to be under size; color red, sometimes almost black, flesh yellow, firm and crisp; one of the best. November to May.

Grimes' Golden.—Tree upright and hardy, fruitful; color golden yellow when ripe; medium to large, quality sub-acid, mild and melting; almost best; valuable in every orchard.

Warfield.—Recommended for trial.

CRAB APPLES.

For ornament, preserving, jellies, and cider making. All are of iron-clad hardness.

Hyslop.—Large, roundish, deep red with blue bloom, very pretty; flesh yellowish; excellent for cider and jelly; popular; late.

Martha.—Similar to the Lady apple in size and appearance, hence of unusual beauty; flesh tender, juicy, and good; tree an upright, vigorous grower, an early and very profitable bearer; very valuable. September and October.

Whitney's No. 20.—Large, striped, almost red; flesh yellowish-white, very juicy, sub-acid, excellent; tree vigorous; very valuable. August.

PEARS.

Flemish Beauty.—Large, beautiful, juicy, melting, rich, and fine; strong grower and good bearer; hardy everywhere. August and September. Dwarf and standard.

Howell.—Large, light, waxen-yellow, with a fine red cheek; handsome, rich, sweet, melting; perfumed aromatic flavor; tree an upright, free grower, an early and profuse bearer; very hardy and valuable. August and September. Dwarf and standard.

Louise Bonne De Jersey.—Rather large, greenish-yellow, with a bright-red cheek; juicy, buttery, and melting, excellent; very productive; a fine grower on both pear and quince. September. Dwarf and standard.

No. 508, Bessemananka.—We have been able to propagate and distribute the famous seedling pear of Russia quite extensively. Fruit

medium in size, Bergamotte-shaped, green, with some russet, and often blushed on sunny side; flesh tender, juicy, almost buttery, and better than good for dessert. The tree is an upright grower, with first-class dark-green leaves, that never rust or mildew. We have good reason to believe that this pear will prove hardy and bear abundant crops of good fruit over a wide area of the West.

No. 347, Gakovska.—This is a good specimen of the larger cooking pears of Russia. Fruit of large pyriform, green and yellow in color, very long stem; flesh rather coarse, not astringent, but too firm for dessert use until overripe. Matures from gritty core outward, and when about ready to decay, pleasant for eating. For culinary use it is the best. The trees seem quite as hardy as the Duchess apple, and as hard to kill by abuse as a Box Elder. The leaves are so thick and firm that the pear-leaf mite cannot affect an entrance.

Tyson.—Rather large, bright yellow, with a brown cheek; melting sweet and delicious. August. Dwarf and standard.

Bartlett.—Large size, with often a beautiful blush next the sun; buttery, very juicy, and highly flavored; tree a strong grower, bearing early and abundantly; very popular. Last of August and first of September. Dwarf and standard.

Beurre Giffard.—An excellent variety; medium, greenish-yellow, red in the sun; very early; tree slender, but healthy; hardy, a free grower, very productive. July. Dwarf and standard.

Clapp's Favorite.—A large, new, fine pear, resembling the Bartlett, but without its musky flavor; pale lemon-yellow, with brown dots; fine texture, melting, buttery, juicy, with a rich, sweet, delicate, vinous flavor; tree hardy and very productive; a promising fruit of great excellence. Last of July and August. Dwarf and standard.

Beurre d'Anjou.—A large, fine pear; buttery and melting, with sprightly, vinous flavor; tree a fine grower and a good bearer. September and October. Dwarf and standard.

Duchess d'Angouleme.—Very large, greenish-yellow, sometimes a little russeted; makes a beautiful tree; does best on quince; one of the best. September and October. Dwarf.

Lawrence.—Medium, light yellow; buttery, sugary, excellent; reliable, productive, profitable; the best winter pear. Early winter.

Kieffer.—From the seed of the Chinese Sand pear crossed with one of our cultivated varieties. Large, showy, rich golden-yellow, dotted

thickly, shaded red ; quality fair to good ; juicy, firm ; strong, vigorous grower, early bearer, and wonderfully productive ; very profitable. Mid-autumn.

CHERRIES.

Early Richmond.—Good, healthy tree ; early and prolific bearer ; yellowish-red when fully ripe ; profitable for market.

Belle Magnifique.—Tree hardy and productive ; fruit large, bright-red ; flesh juicy, sub-acid ; later than Richmond.

Reine Hortense.—Tree very symmetrical and productive ; fruit large, bright, lively-red, flesh tender, juicy, delicious, slightly sub-acid.

English Morello.—Tree slow grower, but very abundant bearer ; very hardy ; fruit slightly conical, dark-red, almost black when fully ripe ; three weeks later than Richmond ; most profitable.

Olivet.—Especially fine, round-headed tree ; little tardy in bearing ; fruit large, crimson-red ; later than Richmond.

Ostheim.—From Russia. Large, dark-red, becoming when fully ripe a dark purplish-red ; flesh dark, tender, juicy ; pleasant, sweet, sub-acid ; tree exceedingly hardy ; a vigorous grower, and productive.

PLUMS.

Miner.—Fruit medium, oblong, pointed at apex ; skin dark purplish-red, with fine bloom ; flesh soft, juicy and vinous ; adheres to the stone.

Wild Goose.—Tree healthy, limbs studded with sharp spurs ; fruit medium ; color red or carmine ; fine flavor ; and very productive.

Forest Garden.—Has given good satisfaction where tried.

Blue Damson.—Fruit small, oval ; skin purple, covered with blue bloom ; flesh melting and juicy, rather tart ; separates partly from the stone. September.

Mariana.—A seedling of Wild Goose ; very handsome and good ; exceedingly prolific, an early bearer ; fruit round, and smaller than the Wild Goose ; rather thick skin ; a deep cardinal-red when fully ripe ; stone small, and fruit of fine quality ; ripens from two to three weeks after the Wild Goose ; free from the ravages of curculios and other insects, and bears uniformly heavy crops. In addition to its value for fruit, its great vigor renders it of untold worth.

Pottawattamie.—A plum of the Chickasaw family, but quite distinct from any other variety ; perfectly hardy, and an immense, early, an-

nual bearer. Four-year-old trees are said to have borne a crop of two bushels to the tree. Fruit is yellow, overspread with a bright pink, and prominent white dots; flesh beautiful golden yellow, luscious, good; ripens in July. The sting of the curculio does not seem to affect the fruit, as every plum ripens evenly and perfectly. It is a good early plum, and cannot be surpassed for canning.

PEACHES.

Alexander.—Of recent introduction; handsome; of delicious flavor; two to three weeks earlier than Hale's Early. Twentieth of June.

Amsden.—New, very early—three weeks before the Hale's Early, and a few days before the Early Beatrice. The tree is hardy, vigorous, and very productive, and the fruit has remarkable keeping and carrying qualities. Fruit rather larger than Hale's Early; roundish, a little flattened, with a slight suture; color red, beautifully shaded, and mottled with a very dark red, nearly covering the greenish-white ground; flesh white, with a delicious flavor. Twentieth of June.

Crawford's Early Melocoton, (Early Crawford.)—This very beautiful yellow peach is highly esteemed for market purposes. Fruit very large, oblong; skin yellow, with fine red cheek; flesh yellow, juicy, sweet, and excellent; tree very vigorous, tender in bloom here. Last of July.

Stump the World.—Very large, roundish; skin white, with a bright red cheek; flesh white, juicy, and good. Last of September.

Crawford's Late, (Melocoton.)—In appearance resembles C. Early, but larger, and even more beautiful, and ripens from two to three weeks later; one of the best and most profitable of peaches.

RUSSIAN APRICOTS.

Gibb.—Tree hardy and symmetrical; a good bearer; fruit medium size; color yellow; flavor sub-acid, rich, juicy; season, June 20th; the best early variety, ripening with the strawberry. It cannot help proving a great acquisition to the list of northern fruits.

Alexander.—Tree hardy; an immense bearer; fruit large size; color yellow, flecked with red, both skin and flesh—a beauty; flavor sweet, delicious; shape oblong; season July 1st. One of the very best.

Nicholas.—Tree hardy; splendid bearer; fruit medium to large;

color white; flavor sweet, melting; season July 10th. A handsome and valuable variety.

Alexis.—Tree hardy; an abundant bearer; fruit yellow, with red cheeks; size large to very large; flavor slightly acid, rich, and luscious; season July 15th. A good sort.

Catharine.—Tree hardy, vigorous, productive; fruit medium size; color yellow; flavor mild, sub-acid, good; season July 20th.

J. L. Budd.—Tree a hardy, strong grower, and profuse bearer; fruit large size; color white, with red cheeks; flavor sweet, extra-fine, with a sweet kernel, as finely flavored as the almond, and used for the same purpose; the best variety, and a decided acquisition; season August 1st.

IMPROVED DWARF JUNE BERRY.

For several years we have been watching the juneberry, and have come to the conclusion that it is one of the most valuable berries, and it should be planted on every farm in the West. The wood is hard and firm, and endures the extremes of our climate without injury. Its leaves are a dark, glossy green, and very much resemble the pear. The plant propagates from suckers. The flowers appear about the same time as those of the apple. The petals are white, and five in number. The fruit is borne in clusters like the currant, and ripens in June. Its size equals the wild gooseberry; shape round; color reddish-purple at first, and becomes a bluish-black when fully ripened. Its flavor approaches the huckleberry—a mild, very rich sub-acid. Most people like its quality, and pronounce it delicious. It may be served with sugar and cream, or cooked sauce, and is splendid canned for winter use. The plant is about the height and form of the currant bush. It produces fruit in enormous quantities, and bears every year. It is also perfectly hardy, not being injured by wet, cold, or dry weather, and needs no special treatment. Rabbits do not injure it, and it will grow readily with only a scanty root.

GRAPES.

Moore's Early, (The Early Grape).—Vines strong growers, and hardy in southern portion of the state; berry larger than Concord, but not a large bunch; ripens nearly two weeks earlier, and superior table grape; valuable for Nebraska.

Worden.—Much like Moore's Early, but later than Concord; qual-

ity good ; vines very productive, and perfectly hardy, as far as reported ; ripens September to October.

Elvira, (White Grape.)—Productive, an enormous grower, and perfectly hardy ; fruit ripens after Concord ; flesh very sweet, aromatic ; berries inclined to crack open when fully ripe ; bunch very compact.

Lady.—Vine stocky and hardy in Southern Nebraska ; fruit medium, of a yellow-white color, very sweet and juicy, quality first rate ; produces as well as Martha ; ripens with Moore's Early. Worthy general cultivation.

Empire State.—This stupendous grape is a seedling of Hartford Prolific crossed with Clinton—hence is free of foreign blood—by that great hybridizer, James H. Ricketts, who sold the original vine to the introducer for \$4,000. The vine is a remarkably strong grower, very hardy, (has endured 32° below zero,) and exceptionally free from mildew, and an early and heavy bearer. The clusters are exceedingly large, (from six to ten inches long, and shouldered ;) berry medium to large, white with a slight tinge of yellow, with a heavy white bloom, rendering it most beautiful ; tender, juicy, sweet, rich, spicy, and pure flavored ; adheres to the skin with great tenacity, does not crack, and ripens with Moore's Early and Hartford. It is also said to continue upon the vine for a long season, and when gathered and properly handled, equals as a keeper the famous Catawba. Owing to its great beauty, fine quality, size and compactness of bunch, and shipping qualities, together with the vigor, hardiness, productiveness, and mildew-resisting foliage, it becomes apparent that it is nothing less than a prodigy.

Early Victor.—This new Kansas grape has fruited at Monmouth three seasons, and is valuable for its fine quality, and earliness, ripening, as it does, a little after Moore's Early. In bunch and berry it is a little below the average in size, but of superb quality ; without pulp or foxiness, rich, sprightly, pure, and refined ; berries black, adhere well to the stem, and have never been known to crack ; vine of rampant growth, exceedingly productive, hardier than Concord, and one of the few that resist mildew perfectly.

Pocklington.—Berries exceedingly large ; clusters large and compact ; beautiful ; vine hardy, productive, and mildew-resisting ; quality quite foxy, with pulp, but sweet ; color greenish-amber ; a noble grape. Midseason.

Lady Washington.—Clusters of enormous size, greenish-white, and lacking in quality; vine of rampant growth, very productive, with good foliage; showy, profitable, poor. Late.

Vergennes.—Purple or bronze; bunch and berry good sized; quality extra fine; vine vigorous, productive; ripens early; especially valuable for its keeping qualities.

Agawam, (Rogers' No. 15.)—Large; dark red; sweet, sprightly, pleasant aromatic flavor; vigorous and productive.

Perkins.—As early as Hartford; pale red, with lilac bloom; sweet, fair quality; better than Hartford; very productive and healthy.

Goethe, (No. 1.)—This is, for the West, decidedly the best of all Mr. Rogers' hybrids; bunch medium, rather loose, shouldered; berry very large, oval; very good already when yet white, when it resembles the White Malaga; pale red, with beautiful bloom when fully ripe; thin skin; tender pulp; very juicy, sweet, and delicious, resembling Frontignan in flavor; ripens after Concord; too late for the East or North to be fully appreciated there, but exceedingly productive, vigorous, and healthy here, but should not be overtaxed when young, as, like most of Rogers' hybrids, it is apt to overbear; very fine for market and table, and makes a delicious white wine.

Concord.—Popular; one of the most profitable and productive of all hardy grapes; bunch and berry large; black, juicy, and sweet; early, hardy.

Martha, (White Concord.)—Large, pale yellow; strongly resembles the Concord in all points except color; hardy and vigorous.

CURRENTS.

Red Dutch.—One of the oldest varieties; bush healthy and productive; berry medium, of good quality.

Versailles.—A long, large-bunched currant; strong grower and large clusters; red berries.

Long Bunch Holland.—Not so strong a grower; very prolific, with fine clusters of fruit; one of the very best.

Victoria.—Rather later than the above; berry good size, remaining for a long time on the bush after ripening; canes strong and stocky.

Fay's Prolific.—Recommended for trial as being remarkably hardy and productive.

White Grape.—Very large, yellowish-white, sweet or very mild

acid ; excellent quality and valuable for the table. The finest of the white sort. Very distinct from White Dutch, having a low, spreading habit, and dark-green foliage. Very productive.

BLACKBERRIES.

Snyder.—The berry for the masses ; perfectly iron-clad ; immense bearer ; fruit medium to large size, sweet and melting. While the Snyder is the only berry generally tried, which has stood the test, we would recommend for further trial Ancient Briton, and Stone's Hardy.

Agawam.—Excellent for the home garden, and very desirable, as an abundant supply of good berries may be raised with but little trouble. Canes very hardy and productive. Berries of fair size, so sweet as to have gained for it the name of the "Sweet Blackberry," and, unlike most blackberries, fully ripe as soon as black. Midseason.

McCracken.—New, hardy, very productive ; fruit large size and of the best quality. Valuable for the north.

GOOSEBERRIES.

Industry.—A new foreign variety that promises to be a valuable acquisition. It has been grown in this locality the past four years, giving the best of satisfaction ; an immense yielder, and has shown no signs of mildew.

Houghton's Seedling.—A vigorous American sort ; very productive ; free from mildew. Fruit medium, roundish, smooth, of a pale-red color ; tender, sweet and of a delicate flavor.

Downing.—A strong, vigorous grower, and abundant bearer ; heavy foliage, protecting the fruit ; large size, oval, greenish-white, inclined to yellow.

Smith's Improved.—Fruit large, pale greenish-yellow, skin thin, excellent quality, not surpassed for table or cooking.

BLACK RASPBERRIES.

Gregg.—The largest berry of the black caps ; very firm, good shipper ; quality not quite equal to the Mammoth Cluster ; very productive ; the best for market.

Tyler.—One of the finest black caps ; great bearer, early, good size, fine flavor, best for drying.

Hopkins, (Cap.)—Nearly as early as Doolittle, very much larger

and of high quality. Canes vigorous and productive. An improvement upon the popular Mammoth Cluster, which it much resembles in appearance of fruit and cane.

RED RASPBERRIES.

Turner.—Has been well tried, and cannot be recommended too highly; very productive, large size, fine color; one of the most valuable for market or home consumption.

Cuthbert.—Hardy, very productive; large size, conical, rich crimson, very firm, and bears shipping well.

STRAWBERRIES.

Crescent, (Pistillate Plant.)—The most productive; 400 bushels have been grown per acre; larger and better than the Wilson, bright color, ripens early; plants vigorous, must be fertilized by a staminate variety.

Chas. Downing, (Staminate.)—Very productive, good size, bright color, crimson, excellent quality.

Misser.—One of the very best for home use; rather tender for shipping.

Mount Vernon, (Staminate.)—Excellent late berry, plants seem to stand hot sun, does not rust, excellent for market; berries dark crimson and continues long in fruiting after most others are gone.

Cumberland, (Pistillate.)—Plant, a very stocky grower with extra amount of root; berries too tender for long shipment, very large, flavor first-class.

Piper's Seedling, (Staminate.)—A new iron-clad, withstanding climatic changes well, profuse bearer, quality good, bears handling well.

Captain Jack is still of great value, both as a home-market berry and for shipping. Its bright color makes it a favorite in our market; it is firm and very productive.

Miner's Prolific.—Somewhat similar to Charles Downing, but is larger, darker in color and its foliage does not burn, but is clean and healthy. Berries are ridged and furrowed, of mild pleasant flavor, but soft for distant shipment. Very productive. Profitable for a home market by reason of its productiveness. Midseason.

James Vick.—Similar in all respects to Captain Jack, but even more prolific. It is often highly profitable as a market berry, by reason of its firmness and productiveness.

Jessie.—The berry is of good size, moderately firm, not so much so

as Wilson, but similar to Crescent in that respect, and of better quality. It is said to be exceedingly productive, and is warmly praised by those who have seen it in bearing on the grounds of the originator.

ORNAMENTAL AND SHADE TREES.

Honey Locust—*Three Horned Acacia*, (*Gleditschia Triacanthus*.) A rapid growing tree, delicate foliage, of a beautiful, fresh, lively green, and strong thorns. Makes an exceedingly handsome, impenetrable, and valuable hedge.

Judas Tree, (*Cercis*.)—*American*, (*Canadensis*.)—A small tree, covered with delicate purple flowers before the leaves appear.

Linden, (*Tilia*.)—*White or Silver Leaved*, (*Argentia*.)—A handsome, vigorous growing tree; large leaves, whitish on the under side, and have a beautiful appearance when ruffled by the wind. One of the best. *American or Basswood*, (*Americana*.)—A rapid growing, beautiful native tree, with very large leaves and fragrant flowers. *European*, (*Europæa*.)—A fine pyramidal tree, with large leaves and fragrant flowers.

Beech, (*Fagus*.)—*Purple Leaved*, (*Purpurea*.)—A remarkable species with deep purple foliage, changing to greenish purple in autumn. A very striking contrast with other ornamental trees.

Maple, (*Acer*.)—*Ash Leaved*, (*Negundo*.)—A fine rapid growing variety, with handsome light green pinnated foliage, and spreading head. Very hardy. Excellent for avenues. *Norway*, (*Platanoides*.)—One of the most valuable ornamental trees for the lawn; broad, rich, dark-green foliage, and of compact globular form. *Silver Leaved*, (*Dasycarpum*.)—Of exceedingly rapid growth, and desirable for immediate effect.

Tulip Tree, (*Liriodendron Tulipifera*.)—A magnificent native tree, with broad glossy, fiddle-shaped leaves, and beautiful tulip-like flowers. Somewhat difficult to transplant.

Kentucky Coffee, (*Gymnocladus Canadensis*.)—One of the finest ornamental trees, with light feathery foliage and curious seed pods.

Birch, (*Betula*.)—*American*, *Cherry*, or *Mahogany*, (*Lenta*)—A remarkable variety, with large foliage and brilliant golden-yellow bark. *European White*, (*Alba*.)—A very handsome and graceful tree. *American Yellow*, (*Lutea*)—All the birches are very handsome lawn trees.

Elm, (*Ulmus*).—*American White*, (*Americana*).—The noble, spreading, drooping tree of our own woods. One of the grandest of park or street trees.

Magnolia.—*Cucumber Tree*, (*Acuminata*).—A noble, beautiful tree, with very large leaves, and yellow flowers tinted with bluish purple.

Alder.—*Imperial Cut-Leaved*, (*Lacinati Imperialis*).—A very striking and beautiful tree with delicate and beautiful cut leaves; hardy, and of vigorous growth, one of the finest cut-leaved trees in cultivation. New.

Mountain Ash, (*Pyrus*).—*European*, (*Aucupari*).—A fine hardy tree; head dense and regular, covered from July till winter with large clusters of bright scarlet berries. *American*, (*Americana*).—A tree of coarser growth and foliage, and larger and brighter colored berries.

Oak Leaved, (*Queretifolia*).—A variety with large, hoary-lobed leaves; distinct and fine.

WEeping DECIDUOUS TREES.

Mountain Ash, (*Pyrus*).—*Weeping* (*Aucuparia Pendula*).—A beautiful tree, with straggling, weeping branches; makes a fine tree for the lawn; suitable for covering arbors.

Weir's Cut-leaved Silver Maple.—A variety of the Silver Maple. One of the most remarkable and beautiful trees, with cut or dissected foliage, and slender drooping branches; one of our handsomest and most successful weeping trees.

Elm, (*Ulmus*).—*Galena Weeping*.—A splendid variety of our native elm; originated at Galena, Ill.; with long pendulous branches, and very large foliage, closely set, so that each branch forms a complete wreath of beautiful foliage.

Birch, (*Betula*).—*Cut-leaved Weeping*, (*Laciniata Pendula*).—An elegant erect tree, with slender, drooping branches, and fine cut leaves. A magnificent variety, and worthy of a place on every lawn.

Willow, (*Salix*).—*Weeping*, (*Babylonica*).—Our common and well-known weeping willow.

DECIDUOUS SHRUBS AND CREEPERS.

Almond, (*Amygdalus*).—*Dwarf Db. Rose Flowering*, (*Pumila Rosea*).—A beautiful shrub with small, double, rosy blossoms. *Dwarf Double White Flowering*, (*Pumila Alba*).

Berberry, (*Berberis*.)—*Common European*, (*Vulgaris*.)—Red-fruited. *Purple-leaved*, (*Purpurea*.)—An interesting and beautiful variety, with violet-purple leaves and fruit.

Purple Fringe, *Smoke Tree*, (*Rhus Cotinus*.)—A very much admired and conspicuous shrub or small tree, with spreading habit, so as to require considerable space; covered in midsummer with a profusion of dusky, fringe-like flowers; desirable for its striking peculiarity of flowering.

Quince, *Japan*, (*Cydonia Japonica*.)—*Scarlet*.—An old and esteemed variety, having a profusion of bright scarlet flowers in early spring, and one of the best early shrubs we have; makes a beautiful and useful hedge.

Viburnum.—*Snow Ball*, (*Opulus*.)—A well known favorite shrub, of large size, with globular clusters of white flowers in June.

Wiegelia.—*Rose colored*, (*Rosea*.)—Anelegant shrub with fine rose-colored flowers; introduced from China by Mr. Fortune, and considered one of the finest plants he has discovered. Quite hardy; blossoms in May. *Amabilis* or *Splendens*.—Of much more robust habit; large foliage and flowers, and blooms freely in autumn; a great acquisition. *Alba*.—Flowers white, changing to light, delicate blush; foliage light-green; very distinct.

Spirea.—The *Spireas* are all elegant, low shrubs, of the easiest culture, and their blooming extends over a period of three months. *Dbl. Flowering Plum Leaved*, (*Prunifolia*, fl. pl.)—Very beautiful; its flowers are like white daisies; from Japan; blooms in May. *Callosa Alba*.—A new, white flowering variety; of dwarf habit; very fine. *Lance-Leaved*, (*Lanceolata* or *Reevesii*.)—Narrow, pointed leaves, and large, round clusters of white flowers that cover the whole plant; a charming shrub; blooms in May. *Lance-Leaved*, (*Reevesii*, fl. pl.)—Flowers double like small roses. *Billardi*.—Rose color; blooms nearly all summer.

Deutzia.—*Rough Leaved*, (*Scabra*.)—One of the most beautiful, profuse flowering shrubs; white. *Slender-Branched*, (*Gracilis*.)—A charming species, introduced from Japan by Dr. Siebold; flowers pure white; fine for pot culture, as it flowers freely at low temperature in the winter. *Crenata Flora Plena*.—Similar in growth and habits as the above; flowers double, white, tinged with rose. The finest flowering shrub in cultivation.

Enonymus, (Burning Bush.)—*Strawberry Tree*.—A very ornamental and showy shrub. Its chief beauty consists in its brilliant berries, which hang in clusters from the branches until midwinter; berries rose colored; planted with a background of evergreens, the effect of contrast is very fine.

Forsythia.—*Viridissima*.—Leaves dark green; flowers bright yellow, very early in spring. A fine, hardy shrub. Introduced by Mr. Fortune, from China.

CLIMBERS.

Virginia Creeper, (*Ampelopsis Quinquefolia*.)—A native vine of rapid growth, with large, luxuriant foliage, which in the autumn assumes the most gorgeous and magnificent coloring. The blossoms, which are inconspicuous, are succeeded by handsome, dark blue berries. The vine is best calculated to take the place in this country of the celebrated English Ivy, and is really in summer not inferior to it. *Ampelopsis Vetchii*.—A new Japan variety, very desirable.

Wistaria.—*Chinese*, (*Sinensis*.)—A most beautiful climber, of rapid growth, and producing long, pendulous clusters of pale blue flowers. When well established, makes an enormous growth; is very hardy, and one of the most superb vines ever introduced. *American*, (*Frutescens*.)—A native variety of vigorous habit, and small clusters of light blue, fragrant flowers.

Clematis, or *Virgin's Bower*.—*Jackmanii*.—One of the finest, with large, splendid flowers, of a rich, velvety, violet purple, distinctly veined, very vigorous, hardy, and free flowering. *Flammula*, (European Sweet Clematis.)—Flowers white and fragrant. *Viticella*.—Flowers purplish-red, very showy; abundant bloomer.

Honeysuckle, (*Lonicera*.)—*Monthly Fragrant*, or *Dutch*, (*Belgica*.)—Blooms all summer; very sweet. *Scarlet Monthly*, (*Coral*.)—A very strong grower, and the best bloomer of all; bright scarlet flowers. *Chinese Twining*, (*Japonica*.)—Holds its foliage nearly all winter; blooms in July and September, and is very sweet. *Yellow Trumpet*, (*Aurea*.)—A well-known variety, with yellow trumpet flowers.

EVERGREEN TREES.

Arbor Vitæ, *Siberian*, (*Siberica*.)—The best of the genus for this country; exceedingly hardy, keeping color well in winter; growth compact and pyramidal; makes an elegant lawn tree; of great value for ornamental screens and hedges.

Pine, (*Pinus*)—Austrian or *Black*, (*Austriaca*.)—A remarkably robust, hardy, spreading tree; leaves long, stiff, and dark green; growth rapid; valuable for this country. *Scotch*, (*Sylvestris*.)—A fine, robust, rapid growing tree, with stout, erect shoots and silver-green foliage. *White*, (*Strobus*.)—The most ornamental of all our native pines; foliage light, delicate or silvery green; flourishes in the poorest soils.

Spruce, (*Abies*.)—*Norway*, (*Excelsa*.)—A lofty, elegant tree of perfect pyramidal habit, remarkably elegant and rich, and as it gets age has fine, graceful, pendulous branches; it is exceedingly picturesque and beautiful. Very popular and deservedly so, and should be largely planted. One of the best evergreens for hedges. *American White*, (*Alba*.)—A tall tree with loose, spreading branches, and light green foliage. *Virginian*, (*Virginica*.)—The Red Cedar.—A well-known American tree, with deep green foliage; makes a fine ornamental hedge plant and also a good lawn tree. Does well in the driest situations.

Of the spruces there are three that are recognized as distinct species—there may be more. *Picea Pungens*, (of Engelman;) *Abies Menziesii*, (of Douglas.) This beautiful spruce was discovered by Douglas in Northern California, and is found along our western coast as far north as the island of Sitka. It is also found in the Rocky mountains, in the gulches, and on the northern slopes near the streams, at an altitude of 7,000 to 9,000 feet. I consider this the most useful of all the evergreens for ornamental purposes in Nebraska, for the following reasons: It is easy to propagate. It bears transplanting remarkably well. Endures the coldest winters and hottest summers equally well. It is the most beautiful in form and color, varying from dark green to almost silvery white.

The Menzies spruce is found growing in many grounds in Iowa and Nebraska, and is doing well wherever tested. It is a rapid grower, and should be in every collection.

Picea Engelmanni, (of Engelmann;) *Abies Engelmanni*, (of Hoopes.) This spruce was discovered by Dr. Parry, who named it after Dr. Engelmann. This spruce was found growing on the northern slopes, and in the gulches on the headwaters of the streams on both side of the snowy range, where the altitude is more than 8,000 feet; it is found most abundant at 9,000 to 10,000 feet; it is mixed

with *Abies Sub. Alpina*, *Pinus Flexilis*, and *Pinus Aristata* in its upper altitudes, and with *Pinus Ponderosa* and *Pinus Contorta* in its lower altitudes.

This spruce is doing remarkably well wherever tried; it transplants as well as the *Menziesii*, and makes a very handsome pyramidal tree. The foliage varies in color from a dark green to a very light bluish-green. It is a very slow grower, but is beautiful at all times, and should be in every collection.

Picea Alba Dakotaii, Black Hills Spruce. This spruce is a variety of the White Spruce which is destitute of the unpleasant odor of the eastern variety. It is found in Wyoming, Dakota, and in the mountains north and west from there, up into the British Possessions. It is a rapid grower, and makes a very beautiful pyramidal tree. It transplants easily, and should be in every collection.

Tsuga Douglasii (Lindley); *Abies Douglasii* (Carriere). This beautiful conifer was discovered by Menzies in the year 1797, at Nootka Sound. The variety we have in Colorado is perfectly hardy, while the variety found on the Pacific coast is tender. This is the nearest approach to the hemlock of any variety in the mountains in Colorado. It is distributed over a greater range of altitude than any other conifer, except the *Pinus Ponderosa*, which occupies the same region as the Douglas, but extends to much lower altitudes. The Douglas is a little hard to transplant. It should be in every collection.

Pinus Ponderosa Douglas.—This pine is found growing everywhere in the Rocky mountains from Southern Colorado to Northern Dakota, and probably further north. Its altitude is from 4,000 to 10,000 feet. It is found most plentiful at 7,000 to 8,000. Is found north of Empire, Colorado, at an altitude of a little more than 10,000 feet, also on Pike's Peak to about 11,000. It grows in Northwestern Nebraska, on the Niobrara and Loup rivers, at an altitude of about 4,000 feet, and is the only pine indigenous to the state of Nebraska.

MISCELLANEOUS.

MATTER SELECTED FROM VARIOUS SOURCES ON ACCOUNT OF ITS
GOOD QUALITIES.



ORCHARDS ON THE PRAIRIES.

During the three days' session of the Kansas State Horticultural Society, which began at Topeka on December 2d, the usual wide range of topics was under discussion, but throughout the entire meeting it was easily seen that the subject of paramount interest was that of the apple orchard, and especially the growing of market sorts. This was doubtless due in part to the shortage of the apple crop in the east and the presence in Kansas last fall of a host of eastern buyers who took the surplus of apples at high prices. Much had been published in state papers about the Wellhouse orchard of Leavenworth county, and when the manager and part owner, Mr. F. Wellhouse, of Fairmont, took the floor as chairman of the standing committee on orchard culture he was plied with numerous questions relating to every feature of the great enterprise. From his replies and from additional information kindly given I gathered the following: The orchard is owned by Messrs. Wellhouse & Wheat and contains 437 acres of trees in bearing, planted in 1876, 1878 and 1879. Of the principal varieties planted Ben Davis occupies 225 acres, Missouri Pippin seventy acres, Winesap seventy acres, Jonathan forty acres, Cooper's Early White sixteen acres, and Maiden Blush sixteen acres. In 1889 and 1890 of Ben Davis 370 acres were planted, Missouri Pippin 260 acres, Jonathan 120 acres, York Imperial fifty acres, and Gano twenty acres. There were planted in the older orchard a total of 52,000 trees, of which it is estimated that 40,000 are alive to-day. The heaviest loss occurred from the effects of the winter of 1884-5. With a very wet fall the trees made a late growth and went into the winter full of unassimilated sap. With the mercury at twenty degrees below zero during January many trees burst their bark, others were split through the trunk. Many that did not die from this injury the next season only lived a year or two longer. The loss from this cause was greatest among the Ben Davis trees, amounting to about fifteen per cent of the whole. It will be seen that the number of trees planted gives about 119 to the acre. It is but fair to say that Mr. Wellhouse now regards this planting as too close, and their young orchards mentioned

above are set sixteen feet apart, in rows thirty-two feet apart, running north and south, which will admit of thinning one-half if found desirable.

The location of these orchards is upland-prairie of average fertility, the subsoil being a red clay containing considerable sand. Mr. Wellhouse advises cultivating the land to corn till the trees come into bearing, after which he would seed to red clover. Stock should be kept from the orchard, especially hogs, as their tramping packs the ground, and by rubbing and rooting about the trees they do a great deal of damage. The clover crop is not removed from the orchard, but with a long machine resembling a stalk-cutter, but with smaller diameter, the weeds and clover are cut and allowed to remain on the ground, the object being to secure a loose, mellow soil among the trees, resembling a forest-bed as much as possible. Spraying with London purple in the proportion of one pound to 100 gallons of water was tried last year to destroy the codling moth. A part of the orchard was sprayed twice and the rest three times; but the third application seemed to scald some of the leaves without being of any benefit.

Mr. Wellhouse has discarded, as useless for his purpose, all the spraying machines and nozzles upon the market, and he uses a tank fifteen inches deep, three and a half feet wide, and four and a half feet long, slung between the wheels of a wagon. Upon this is mounted a common rotary pump, operated by means of a sprocket-wheel and chain from one of the hind wheels. This gives a positive action, starting the spray the instant the wheels start and stopping it as quickly, avoiding the unpleasant waste and drip occasioned by the pressure from the air-chamber of the force-pump. The nozzle finally adopted is one of their own construction, having a fine slit in the casting resembling a gas-burner. This gives a broad, fan-like spray, and enables the operator to cover one side of the row of trees in driving by, at the same time managing the team. Ponds for collecting surface water to be used in spraying are constructed at convenient distances by damming ravines or draws. A man and team spray 160 acres in about five days. Adding to this the cost of poison and it brings the cost of spraying once to about fifteen cents per acre.

Everything in connection with the enterprise is reduced to the most careful system, and an accurate account has been kept of all expenses and receipts since the planting of the orchard. The actual yield of so

large an orchard, over a period of eleven years, is a matter of much interest, and I am permitted to give you the following figures: In 1880, 1,594 bushels were gathered; in 1881, 3,887; in 1882, 12,037; in 1883, 12,388; in 1884, 11,726; in 1885, 15,373; in 1886, 34,990; in 1887, 33,790; in 1888, 20,054; in 1889, 11,952; and in 1890, 79,170 bushels. The last crop, it will be noticed, is more than double that of any previous year. This, at the high prices which ruled, gave a gross income of about \$50,000. The entire outlay for the year, including barrels for shipment, amounted to \$14,000, of which \$7,000 were paid for picking. This left a net profit of \$36,000, or \$82.38 an acre, which gives considerable color to the story which went the rounds of the press during the fall that the crop from many Kansas orchards this year had sold for more than the entire land was worth.

His Jonathans gave Mr. Wellhouse the best prices, bringing from \$3.50 to \$3.75 a barrel of three bushels. Ben Davis, Winesap, and Missouri Pippin were contracted to eastern firms at \$3 a barrel. During the entire eleven years the Missouri Pippin has taken the lead for profit, and this year's returns placed it still further ahead. The Winesap they have not found as profitable as the other sorts, the size of the fruit averaging too small, and it is not included in their new plantations. The York Imperial they regard as a promising apple for their locality, and they are planting it quite extensively. The Gano, a new apple originating with a fruit-grower of that name near Lee Summit, Missouri, was mentioned with much favor by Mr. Wellhouse. It is described as closely resembling the Ben Davis in tree and fruit till the latter begins to color, when it takes a much deeper color, has more yellow and firm flesh, and is generally conceded to be a better keeper. Mr. Wellhouse closed his remarks by adding, very aptly, that he was looking with a good deal of interest for the coming apple, and wanted to get some trees of it to plant.

In the general report on fruits from different parts of the state the Winesap received rather better treatment, and will doubtless continue to be planted largely as a reliable late keeper of much better quality than either Missouri Pippin or Ben Davis. Rawle's Genet, except in a few favored localities, was declared to crack and rot badly on the trees, besides keeping poorly after it was gathered. It is being largely discarded.

An instructive paper prepared by Professor L. H. Bailey, of Cornell University, entitled "Causes Affecting the Longevity of Orchards," was read by the secretary. The ground taken was, that the supposed greater longevity of old seedling orchards in the east was more apparent than real; the trees which attracted attention being the few fittest to survive, while the many which perished prematurely escaped notice. The popular cry against root-grafting on stocks from pomace seed, as tending to deteriorate the vitality of varieties, had no foundation in fact. The even stand and uniform character of trees in modern orchards showed that the cion either dominated the stock or had become self-rooted. The short life of many orchards in the west must be accounted for by the fact that they were in a prairie region beyond the limits of natural forest growth.

The general opinion of the members of the society seemed to be that while the older orchards of the state show that they are destined to be short lived, we should not be discouraged by this fact. With the abundance of comparatively cheap land in the state and the small outlay needed for planting, young orchards should be set as fast as the old ones show signs of failing, and the supply of vigorous, bearing trees kept up.

It was thought that the rapid development of the country to the north and west beyond the range of profitable apple-culture must give a market for Kansas apples at paying prices for a long time to come.—S. C. M., in *Garden and Forest*.

PREVENTING APPLE SCAB.

THE FUNGICIDE TO USE AND FIGURES TO SHOW ITS EFFICIENCY.

In the seventh annual report of the Wisconsin Experiment Station, Prof. E. S. Goff has an article on this troublesome disease. It is so well known to horticulturists that a lengthy description of the fungus, *Fusicladium dendriticum*, will not be necessary. A section through one of these velvety spots shows that it is made up of a dense mass of short brown cells which bear erect threads producing the spores or reproductive bodies. The growth of the fungus causes a cracking of the fruit, making it unprofitable. The disease is destructive to a large number of varieties not only in this country, but in Europe, Aus-

tralia, and New Zealand. The losses to orchardists amount to thousands of dollars every year; hence the efforts which have been made to destroy it.

THE SOLUTION AND APPLICATION.

The results of the Wisconsin experiments made under Prof. Goff's direction are highly gratifying, so much so that Mr. Hatch, on whose place the experiments were made, decided to treat his entire orchard of twenty-five acres during the season of 1890. The fungicide used is known as Ammoniacal Carbonate of Copper, and is prepared as follows: Dissolve one ounce of carbonate of copper in one quart of aqua ammonia (strength 21° Baume), and dilute in 100 quarts of water. One and one-half gallons of the diluted solution is sufficient to thoroughly spray a tree of medium size, and two gallons a large one. Four ounces of carbonate of copper and one gallon of ammonia will make 100 gallons of the diluted solution, sufficient to spray fifty large or about seventy medium trees once. These trees should be sprayed at least seven or eight times. The experiments were made on the Fameuse apple. The first trees were sprayed on the 18th day of May and at intervals of two weeks after that until August 10. When the first spraying was done the petals had fallen and the fruits were about as large as peas. The results are so interesting that a few of the figures will not be out of place in this connection.

RESULTS NOTED.

The apples of the sprayed and unsprayed trees were picked and assorted. Three qualities were established, necessarily on somewhat arbitrary lines, viz: First quality, free from scab; second quality, fruit showing scab spots, but of not sufficient size to distort the apples; third quality, fruit more affected. Results of ammoniacal carbonate of copper treatment: The 666 apples examined, ranked first quality, 74.02 per cent; second quality, 24.02; third quality, 1.96. In a check experiment, in which the trees were not sprayed, the number of apples examined was 689. Of these there were in first quality 21.48 per cent; second quality, 56.75; third quality, 21.77. There can be no doubt about the effectiveness of the spraying. The only question still to be determined is the number of sprayings necessary to do the work effectively. Prof. Goff also suggests that one spraying be made after the leaves expand, and just before the flowers have opened. It will

be well to caution the use of the fungicide when the flowers are expanded. Experience with plum trees to prevent rust during the season on the college farm has shown that spraying at this time will cause the flowers to drop more freely. The liquid should be applied with a force pump fitted with a spraying nozzle. Such can be had of the Nixon Nozzle & Machine Company, of Dayton, O.; the Field Force Pump Company, Lockport, N. Y.; Gould's Manufacturing Company, and Rumsey & Co., Seneca Falls, N. Y. Prof. Galloway has also devised a knapsack sprayer, made by Albinson & Co., 2026 Fourteenth street, and Leitch & Sons, 1214 D street, Washington, D. C.—*Orange Judd Farmer*.

LOSSES IN TRANSPLANTING.

[The following paper was read before the Illinois State Horticultural Society at Cairo, by Hon. Samuel Edwards, of North Peoria.]

One of the greatest hindrances to more general planting of trees is the fact that a very large per cent of them which are set by those not engaged in the business die. For this there is no more necessity than that live stock should die from being removed from one locality to another. We can readily understand that trade in animals would receive a severe check if millions of them were thus lost annually.

The hurried manner in which trees are taken up, the roots being unmercifully mutilated, is often, owing to want of skill in planting and after management, a cause of loss. When there are plenty of roots, carelessly crowding them into a hole too small for placing them in proper form, is another.

An account given in an early volume of Downing's Horticulturist, by a Mr. Perkins of Boston, stating his success in planting trees without roots, induced me to try the experiment with some forty dollars' worth of trees, mostly apple and pear, which were delayed en route from Ellwanger and Barry. The mercury had been several degrees below zero, and they were received December 18, 1850.

The roots, of course, were dead. They were cut off to the live wood at, or near, the collar of the tree, and planted in damp sand in a moderately warm cellar. At proper time for planting in spring butts of trees were calloused over, preparatory to sending out roots. Tops were trimmed to bare rods, wounds covered with wax, planted

firmly at proper depth and heavily mulched. Every evening bodies of the trees were moistened with a wet cloth. Nearly every tree grew, among them the highly valued and too little known St. Lawrence apple, prized for fine quality, size and color of fruit, productiveness and hardiness of tree.

Roots becoming dry in transit is fatal to evergreen but not always to deciduous trees, which in many instances can be saved by burying entire tree in moist earth, closely pressed upon it for a few days, when, instead of a shriveled appearance of bark, it will be restored to its original plumpness.

Puddling roots in clay mortar prevents drying or injury by freezing if buried or left well packed in cellar until frost is out. Care should be taken in mixing the puddle to have it of proper consistence—not merely dirty water, or so thick as to have a large surplus adhere to roots. In the first instance it would be of very little, if any, benefit. If too thick, it only adds, unnecessarily, a large percentage to the freight bill. In an instance of the latter known to me, a thousand apple trees of ordinary size for orchard planting weighed 3,300 pounds, adding some fifty per cent to freight.

“Rotten root” is sometimes a cause of loss. In transactions of this society for 1878, H. C. Freeman says of pear trees: “More trees have been killed by the peculiar fungus which attack the roots than by blight.” It is as fatal to apple as to pear trees. A cottony appearance is first noted which is succeeded by warty excrescences and, as the name implies, roots rot and tree dies. Various remedies, as hot water, strong alkaline solutions, have been suggested; pardon my egotism for offering, with implicit confidence, a better one: Put all infected trees on top of a dry brush heap and burn at once. As none of your members buy trees from agents, please suggest that each one of them tell neighbors who do to carefully inspect bodies and roots of trees, and if found to be affected as described, refuse to accept them.

The neglect to properly pack and firm soil among roots is one of the greatest causes of loss. Fine dirt should be well packed in by hand, and all roots covered several inches with it. Pour on a pail or two of water to wash dirt into all possible cavities. After ground settles fill in again, tramp and pound dirt firmly about roots. (I have used post rammer often.) Leave surface soil loose, mulch with prairie hay, straw, or other coarse litter to depth of six inches, extending a foot beyond ends of roots.

Neglect to mulch or frequent stirring surface soil kills many trees, especially if they are daily deluged by water. In a season of protracted drought watering may be necessary. Dig a hole near the tree, water bountifully, then return the earth after water settles.

Wrap bodies of newly set trees with burlaps or any cheap material, to shade from hot sun. In a hot summer, if this is not done, bark is often killed in spots on south or southwest side. Insects having a fondness for the diseased sap are found and borers are generally accused of causing the damage when it should be charged to neglect of the planter to properly shade the body of tree. Spraying trees in the evening in a dry time would often save them.

I have hinted at causes of death to millions of trees annually in the United States. Brethren, you will agree with me that "these things ought not so to be," and it is hoped, in discussions which may follow, you will in wisdom answer the query: What are we going to do about it?

Arbor day is now annually observed by our schools. Would it be proper for your society, through a committee, to confer with the state superintendent and suggest that in the circular sent by him to schools plain instructions be given for the successful planting and after management of trees? The present superintendent, Dr. Richard Edwards, is heartily in accord with the mission of your society, as evinced by the many cordial welcomes received by it at meetings held in the university at Normal during his presidency of that institution. One of the best papers (see transactions 1887) on the ornamentation of the yards of public school houses is from his pen. Without doubt Mr. Raab will co-operate as cordially in the good work.

The lapse of thirty years has not changed my opinion then expressed as your presiding officer: "For a general and radical improvement we must look to the rising generation; our common school teachers must first be enlisted in the good cause, and at every district school house the elements of horticulture must be disseminated." Let each member of this society make it a point the coming season to have some attention given to the subject by at least one school in his immediate vicinity.

GRAPES.

A. D. SMITH, IN AMERICAN RURAL HOME.

Our mode of planting and cultivating was published by this paper some time ago ; therefore, we shall omit this now. Grafting is a matter of importance for testing new varieties, and for the purpose of propagating varieties which are injured or destroyed by the *Phylloxera*. The short life of the finer varieties of the *Labrusca* class, and most of the Hybrids must be attributed to the attacks of the insect. These valuable varieties which are subject to the attacks of the *Phylloxera* can be grafted on those whose roots are *Phylloxera*-resisting, and thus a valuable variety grown. If the cion from a new variety be inserted in the stock, bearing wood will be produced the first year, and in some cases fruit will be produced from the cion the first year, and we thus avoid the slow process of planting out a young vine or a cutting, and waiting three or four years to find whether or not the variety is valuable. It is probable that you have some old vines of little value, or at least of little value in your vicinity, and by little trouble and the loss of the fruit one year you are enabled by grafting to turn the old worthless vines to good account.

There are several conditions generally considered necessary to successful grafting. In grafting it must not be expected that all varieties will unite well with those of other varieties. For instance, the stocks of the *Cordifolia* do not unite well with the *Æstivalis* and *Labruska* varieties, but they do sometimes unite and do well. Some claim that the stock and cion should be from varieties of the same species, but we think this is not necessary ; but yet we would not advise you to use stocks and cions of different species on a large scale till you try them, and find out if they unite well. A point of great importance is that of selecting perfectly healthy and vigorous stock. Never select a sickly vine nor one subject to the *Phylloxera*, as a grafting stock. A cion may be put deep enough below the surface to form its own roots after starting, and thus support itself and dissolve its union

with the old unhealthy stock ; but even when this is done, it takes the vine several years to overcome the effect of the unhealthy stock.

When the object is to guard a variety subject to the *Phylloxera* against this very destructive insect, a variety which will resist the insects should be selected for the stock and one which is perfectly healthy and vigorous. The graft should be inserted near the surface of the ground or above it where this is the object. We believe it is best to graft a weak grower on a vigorous one. The cion should be of last year's growth, rather short jointed, healthy, and about one-eighth or one-sixth of an inch in diameter. They should be cut from the vine before hard, freezing weather. They can be kept in the ground or in the cellar in damp moss, sand, or sawdust.

In the south the fall or early winter is thought to be the best time for grafting. North of $36^{\circ} 30'$ we think it not best to graft in the fall or winter, because the frost causes the ground to heave and the graft may thus be thrown out. In the latitude of Missouri, grafting should be done in the spring before the active flow of the sap begins. As a general thing we have nice, open days in the spring in this latitude for this purpose. At the north, where the spring comes in all at once, there are but few of these fine days in the spring that can be made use of in grafting. In such a place it is generally thought to be best to graft between the exceeding strong flow of sap in the spring and the full development of the first young growth. During this period the flow of sap is not so active, but it exudes from the wound in a very gummy state.

The method of grafting most generally used is called cleft grafting. Select your time for grafting and clear the soil away from about the vine intended for the stock to the depth of about three or four inches, and select a place a little below the surface of the earth where the exterior is smooth, and cut off the vine here with a fine-toothed saw or a sharp knife. The vine should be cut horizontally at this place. Take a grafting chisel or other sharp instrument and split the stock down about one and one-half or two inches. With a sharp knife make the lower end of the cion wedge-shaped to insert in the cleft. It is positively necessary that the bark of one side of the cion should come in close contact with the bark on the stock, but it is not necessary that the bark of both sides of the cion comes in contact with the bark of the stock. The cells of the inner bark of the cion must unite with

the cells of the inner bark of the stock, so the sap can flow from the stock into the cion and sustain its life. If but one side of the cion comes in contact with the bark of the stock it is best to have this side of the cion a little thicker than the other so the stock will hold the forks more firmly together. Insert your chisel or a wedge in the cleft in the stock to hold it open while you insert the cion, and when you get the cion to its proper place withdraw the chisel or wedge and the cion will be held firmly in place by the stock. If it should happen that the stock does not hold the cion firmly in place on account of the smallness of the stock or from any other cause, tie a string tightly around the stock about midway of the cleft. If the stock is one-half inch or more in diameter two cions may be inserted, one on each side. The cion should be three or four inches in length and may have either one or two eyes or buds. Fill up the excavation which you made about the stock, and press it down slightly. If the cion is one that resists the *Phylloxera* well, a part of the cion may be covered up; but if not, the cion should not be allowed to come in contact with the soil enough to produce roots of its own, as it would of course be subject to the ravages of the insect.

There is another method of making the cleft which is worthy of notice. It is that of sawing a slit in the stock with a wide set saw. This is a more tedious mode than the other one, but it is claimed by many to be the more certain. The slit is sawed about one and a half inches down the stock, and the stock is pried open to admit the cion, which rests on the stock with square shoulder on each side. If preferred, the cions may be prepared on rainy days, as the slits are generally of uniform size. This should not be done, however, unless you can keep them in damp moss till you wish to use them, because they will get too dry, if this is not done. One great advantage in using the saw to make the slit is that we can saw rough, twisted stocks which cannot be split with the chisel.

In grafting against the *Phylloxera*, it is necessary to graft above the surface of the earth. It frequently happens that an excellent variety is rendered worthless by the destructive work of this insect; and to guard this variety against this insect, we can graft it on the stock not subject to the ravages of this insect, and in such a manner that the cion cannot form its own roots, called inarching. The cleft method of grafting is not very successful unless done below the surface of the

ground ; therefore, it is best to use the inarching method in grafting against this insect. For this method it is necessary that a vine of the variety intended for the cion be planted about a foot from a vine of the variety intended for the stock. The grafting may be done the first year, if the growth becomes sufficiently hard to bear the use of the knife. The grafting should be done in June, by selecting a shoot from each vine, and at a convenient place where these may be brought in contact, a shaving is cut out from these on the side next to the other for a length from two to three inches. It should be a smooth cut from a sharp knife, and it should be cut a little deeper than the inner bark so that there will be a flat surface on each. Care must be taken to get the cells of the one in contact with the other. When you fit them as well as possible, tie them (or rather wrap them) with some old calico torn in strips, or something of this kind. It is best to have a stake to which to tie the united canes to prevent the wind from disuniting them. They will generally unite in two or three weeks. At this season of the year the growth is very rapid, and on this account you should look over the grafts a few weeks after grafting, and replace the strings which have broken loose, and loosen those which are bound so tight as to cut into the wood. The wrapping should be removed in about seven or eight weeks so the graft will be exposed to the sun to harden and ripen before winter comes. The shoots are let grow the rest of the season, but in the fall, if a good union has been made, the cane forming the cion is cut tolerably close below the union with the cane of the stock, and the stock cane is cut off close above the union. Suckers must not be allowed to grow out from the cane of the stock. When either method of grafting is employed, it is advisable to keep the graft covered during the first few winters with straw or soil, and this is more especially necessary in employing the inarching method, to prevent the frost from splitting the cion from the stock. Understand that the shoots selected from the cion cane and the stock cane are not cut off at the time of grafting.

Pruning is another matter of vast importance. Some claim that if a vine is allowed to take its own course—go unpruned—the fruit will not rot, but we have our doubts about this. It is true that a vine running up a tree or covered with something seems to be less subject to the rot than those in the open vineyard, but we doubt if

their going unpruned has much influence in this direction. We shall speak of the rot and mildew in another paper.

It is a well known law of growth that the buds farthest from the roots start out first in the spring and those nearer the roots start out later. The uppermost buds utilize so much of the sap frequently that those nearest the roots are starved and do not push into growth. If the vine is left unpruned, the foliage and fruit are farther and farther from the roots of the vine each year, and, if we do not prune it, the shoots continually increase in number, and the sap is utilized mainly by the upper parts of these shoots. Now, if we keep the vine pruned back each year, the sap only goes, of course, to where the vine is cut off, and is utilized more by the branches nearer the roots, and the number of shoots is not increasing so fast to draw the sap away from the main part of the vine. This part of the vine now receiving the sap that would otherwise have passed farther up the vine grows with an increased vigor, and the fruit is better. Cut the vine back to two or three buds the first year, and the second year leave a few more.

STRAWBERRY LEAF ROLLER, AND HOW TO TREAT THE PEST.

John Schoemaker, Muscatine, Iowa, writes the *Orange Judd Farmer*: "I would like all the information obtainable in regard to the best way of fighting the leaf roller. I have been troubled with them for years and find them a great pest. It is *uphill business* to raise strawberries where they abound, and it would be worth a good deal to me to know how to get rid of them, without having to give up the business. I have tried the *annual* system—plowing up the patch right after the crop is picked, without success; for they have taken possession of the new bed, planted the same spring before the crop matured. I tried burning over the old beds soon after the crop was off, but the insects left on the new beds make it impossible to get rid of them. Would it destroy the fruit buds if the beds were burned over in early spring? I am inclined to try this plan next spring. It will not kill the plants to burn them over in July, if the beds are first mowed, then with a sulky rake rake the leaves and mulching together then spread it lightly over the whole surface, after which set fire to it

(when a good wind is blowing) just before a shower; the plants will sprout out again in a short time. Now, if they survive this heroic treatment *at the time* when they are weakened by bearing a heavy crop of berries and before they have made new roots, they certainly would be better able to stand it in early spring, and still bear a crop of berries. What do you think? There are no doubt others who are equally troubled with this pest as myself."

This leaf roller is certainly one of the most destructive of the strawberry pests, and when once established is liable to cause great damage. The plan of burning the vines in summer has been highly recommended, and if applied at the right time, when most of the insects are in the pupa stage, must prove a great assistance, though not destroying all the insects. The plan which seems to me would be most effectual, where they are extremely bad, would be to spray the vines with London purple in spring as soon as the leaves are well out and *before the berries are fully set*, which would kill off the spring brood of these insects, as well as destroy the other troublesome pest, the strawberry false worm. Then after the berries are picked, or as soon as the second brood of worms appear, spray again, and a week or ten days later mow and burn as usual, which would be pretty sure to catch any that had reached the pupa stage before spraying. This, of course, means some work for one season, but if thoroughly applied throughout a plantation, there should be comparative freedom from the insect for some years afterward. The spraying can be done very rapidly with a force pump, or the vines can be dusted with the poison if spraying apparatus is not at hand.

KILLING OF UNRIPENED WOOD.

Mr. Theodore Smith, of Washington, speaks of discolored wood of fruit trees in that section, and asks if I can give any reason why one variety should be injured in this way more than another.

The word "hardy" as used is a relative term. If the conditions are favorable in the fall to perfect ripening of the wood most of the temperate zone fruits will endure very low winter weather. To illustrate: In the winter of 1888 Dr. Byron D. Halsted gave much time to the work of trying to discover some difference in the cell structure

of varieties we have called tender and those we call iron-clad. But the fall had been remarkably favorable for the perfect ripening of apple wood, and he failed to find any well marked points of difference between the wood of Ben Davis and Duchess. Yet after giving the winter to patient investigation he decided that Whitney, Tetofsky, Duchess, and the hardy Russians never failed to deposit a "thimble" of hardened crystalline starch at the point of growth on every twig.

This means that, irrespective of the seasons, the truly hardy trees for the west are those that hold perfect foliage during the summer and ripen their wood in the fall like the hickory or the currant bush. It also means more, as this class of trees, as a rule, hibernate as perfectly as the polar bear, or our currant bush and old-fashioned purple lilac. Beyond shadow of doubt if the Rambo and Rhode Island Greening would ripen their wood every fall as perfectly as does the Duchess in our climate, they would endure perfectly our most trying winters, providing also that they were as perfect as sleepers during our winter changes.

Mr. Smith reports truly that some of his black-hearted trees have formed new wood over the diseased structure and promised yet to become valuable. In Iowa we have had these damaged trees by the hundred thousand. But they appear to be sap-poisoned and we rarely get smooth, perfect fruit from them that will keep as it did when the trees were sound.

J. L. BUDD, Ames, Iowa.

EXPERIMENTS WITH STRAWBERRIES.

On the above subject a recent bulletin from the Ohio Agricultural Experiment Station contains the following :

If we separate varieties of strawberries into two classes, viz., those that continue a long time in bearing, and those that have a short season, we find that the most prolific fall into the first class, while those that give small crops continue but a short time in bearing. In other words, those that give the greatest number of pickings during the season produce the largest crops. It might seem that the aggregate crop would depend as much, or more, upon the quantity of fruit ripe at each picking, as upon the number of pickings. It would also seem that the varieties that ripen slowly and continue a long time in

bearing would be more in danger of dry weather than those that yield their crop in a short time, but such does not appear to be the fact.

It is commonly remarked by growers that when the strawberry season is long the crop is greater than when the time of ripening extends over a short period. To cut off two or three pickings is to reduce the crop by about that quantity. The same is essentially true of varieties. A variety that gives three pickings during the season will yield about half the crop of one that gives six. This ratio may not be exact, but such a relation between the number of pickings, or length of season and total product exists. All things considered, the long season varieties are surer and more profitable than those that continue but a short time in bearing.

Nearly all of the very early varieties continue but a short time in bearing, yield but few pickings, and give short crops. The same is true, in a more marked degree, of the extreme late sorts. They commence to ripen late but hold out little, if any longer than the medium varieties. The second early, or medium varieties usually give more pickings during the season, continue longer in bearing than the extreme early and late sorts, hence give a greater total yield.

Those varieties of strawberries that produce pollen and berries also, are at a disadvantage as compared with those that produce berries only. Division of labor counts here as elsewhere. Give a plant nothing to do but to grow and bear fruit and the work will be better done than if an additional task is imposed. To produce pollen taxes the energies of the plant more than is commonly supposed. Many growers think it would be desirable to have varieties with perfect blossoms only to save the trouble of planting the two classes. Theory disproves this plan, and careful observations show that, in general, the most prolific sorts are those that have imperfect flowers.

It should be understood that these statements refer to the leading varieties that are most generally grown. There are some apparent exceptions even with these, and still more if all known varieties are included. Concerning the varieties that are worth considering, the general statements made above will hold good. These generalizations are not only useful in determining the value of varieties in a comparatively short time, but may also serve as guides in future work. Much valuable time has been lost because these principles have been ignored.

ABOUT GOOSEBERRIES.

While it seems impossible to grow the finer foreign gooseberries in this country, owing to mildew on foliage, we may enjoy such native varieties as Houghton, Downing, etc., with as little care and experience as currants. Indeed, says Josiah Hooper in *New York Tribune*, it seems curious that not more of the latter are planted, owing to their abundant crops and culinary usefulness. It is possible for any one to raise the young plants with little trouble, and without any previous experience. Houghton or American Seedling is usually grown from cuttings of mature wood during autumn, made into lengths of about six inches and either set at once in rows or tied in bundles and buried in an upright position in the soil. Fall planting is preferable provided it be done early, and the cuttings protected during winter by mulching. Fibers form whenever the ground is not frozen, and if set in autumn or even in very early spring they will have obtained a very firm hold before hot, dry weather can hurt them. The Downing gooseberry will not readily grow from cuttings, but if the young shoots are bent to the ground, pegged down, and covered with soil, roots will start out during summer and by fall will be ready to separate from the parent plant. Gooseberries delight in deep, rich, moist soil; no other plant responds more quickly to generous applications of manure. It pays to treat the gooseberry well if fine fruit is desired; it is useless to permit them to grow at will as too many cultivators do.

FORESTRY IN DAKOTA.

WHY TREES WILL GROW AND HOW TO GROW THEM.

The following extracts are taken from a paper written for the American Forestry Congress, by J. C. Duffey: Within the borders of Dakota are 3,000,000 acres of native forests. These consist of pine, black and white spruce, burr oak, white elm, white birch, ash, mulberry, ironwood, juniper and many other species of less value. A

large part of this timber is in the Black Hills and Turtle Mountain regions, yet by no means all of it. There are strips of woodlands fringing many of our streams and bordering nearly all our lakes. Along the streams are found elm, ash, box elder, wild plum, wild thorn apple, willow, hackberry, besides many shrubs. Many seem to think that since trees do not grow naturally on the prairies, that they cannot be made to grow there. With as much logic we might argue that since potatoes did not grow naturally in Ireland, that potatoes cannot be made to grow there, and yet potatoes grow nowhere better, unless it be in Dakota. We often hear it said that the Dakota climate is too dry for tree culture, but any one who will for a moment consider the many vegetables grown here, will readily see that this objection fails. Corn, potatoes, wheat, flax, cabbage, celery, and many other vegetables grow here luxuriantly. Where there is sufficient moisture for these plants to grow, there is certainly enough for the moisture of forest trees.

DAKOTA WINTERS.

Are the winters of Dakota so severe as to kill trees? The thermometer does not fall so low in Dakota, as it does in many places where there are dense forests. It is true that many species of trees will not survive our winters. It is equally true that many species of both forest and fruit trees are perfectly hardy here. Trials of from eight to fifteen years have proven that cottonwood, several of the poplars, box elder, ash, elm, black wild cherry, pine, spruce, wild plum, crab and several varieties of the Russian apple and many other trees are perfectly hardy here, and, no doubt, many trees that are now considered unsuited to our climate will be found to thrive here when their peculiar conditions of growth are better understood. The people of Dakota have great faith in forestry. Nearly every one who owns land plants trees. It is now a common thing to see on farms, other than tree claims, five acres of trees; and very few homesteads are entirely destitute of them. These groves are usually composed of several species, principally cottonwood, box elder, ash, and elm.

FOREST VS. PRAIRIE SOIL.

That many attempts at tree culture have failed cannot be denied, but most, if not all the failures are due to ignorance or neglect. In the forests the ground is mellow, loose, porous, and moist. As we

walk among the trees the soil yields beneath our feet like a cushion. The seed as it drops to the earth finds a most congenial bed. There is moisture, warmth, and protection from the sun. As the root begins to develop it finds but little resistance to its downward progress, and it goes deep down into the soil beyond the reach of frost and drought. On the prairies of Dakota all these conditions are reversed, the soil, though deep and rich, is hard and dry, very much resembling a road bed on compactable soil. When the prairies are broken, the plow is run very shallow, not deeper than three inches, and the average Dakota farmer seldom plows much deeper than the original breaking. The young tree, whether from seed, from cuttings, or from the nursery, finds the downward progress of its roots soon stopped by the hard, compact soil. The roots spread out beneath the surface, exposed to the heat from the sun, to drouth, and to the frosts of winter. Trees planted in the soil thus poorly prepared die or make a feeble growth. If they survive the first summer and winter they are often left entirely to themselves the next season; quack grass takes possession of the soil, completing their destruction; and the ignorant or lazy farmer says trees will not grow in Dakota. On his way to market he may drive past half a dozen groves of thrifty trees, but does not trouble himself to learn the secret of his neighbor's success.

To secure the best results from timber culture on prairies, the ground should be tilled for several years before trees are planted,—each time running the plow deeper until the soil is thoroughly pulverized to the depth of twelve inches. I would not convey the idea that a settler should plant no trees until he had worked his ground two or three years. Plant a few trees as soon as possible. A hoed crop should precede tree planting, leaving the ground free from weeds. Great care should be taken that no quack grasses (*Agropyrum repens*) be in the soil. Fall plowing is much better than spring plowing for trees, because it leaves the surface uneven to catch the drifting snow, and the ground in the best possible condition to absorb the water from melting snow and spring rains. Our subsoil is of such a nature that it holds water almost like a reservoir. On ground that has been plowed deep in fall, and was well cultivated the following summer, there is little danger of drought, provided there be sufficient snow in winter and spring to thoroughly saturate the subsoil.

MORTON ON GRAFTING.

THE SAGE OF ARBOR LODGE EXPLAINS HIS POSITION.

The following correspondence explains itself:

TECUMSEH, NEB., January 18.

Hon. J. S. Morton—DEAR SIR: I write you in regard to the talk you made at Lincoln before the State Board of Horticulture about root grafting. As some parties understand you to be opposed to that system and in favor of whole root or budded trees, and I know that you do not wish to be held in a false light, and it did seem that you did favor that system, from *The Bee*, as there was no discussion on the subject at that time, please give me your opinion on the matter. I am sure you would not favor any system unless you thought it was the best. Respectfully yours,

W. R. HARRIS.

NEBRASKA CITY, January 24.

DEAR MR. HARRIS: My intention at the meeting of the Nebraska State Board of Horticulture was merely to draw attention to the fact that our apple orchards were too short-lived, and to inquire whether root grafting was the cause of the early decay of our orchards. Modern orchards do not live as long as the orchards of earlier days of the republic lived in the eastern and middle states. But I do not wish to be quoted as saying that root grafting is a known cause of the early decline of our orchards. These orchards have come earlier into prolific bearing than did those of New York, New England, and Michigan. Possibly they are only another verification of the old proverb "Early ripe, early rotten;" or it may be that in our soil there is an especial element wanting which alone gives long life to certain fruit and forest trees. Among the latter the Lombardy poplar and the rock or sugar maple have, in this neighborhood, been short-lived. But whether root grafted or top, or shoulder grafted, the Nebraska nursery is the place in which, as a rule, to find the best orchard trees for our Nebraska homes. They are acclimated and no doubt are as

much superior for our use, to a foreign bred tree, as a native buffalo was, in hunting its subsistence on the plains, to an imported shorthorn.

The sudden death of our esteemed co-laborer in forestry and orcharding, Hon. Samuel Barnard, is a calamity to the whole commonwealth. His precepts and practices had always been, in private and public life, such as his conscience approved. He was a good man in the broadest, widest sense. And his end came as though he, like a luscious mental and moral fruit, had been gathered for the garners of the Great Ruler who ever knoweth and claimeth His own at the right time. His memory will be fragrant as long as flowers bloom and fruits ripen in our fertile state. Yours truly,

J. STERLING MORTON.

To Mr. W. R. Harris, Tecumseh, Neb.



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